In April 1967, the COSATI program continued to flourish; a chart showing its composition appears on the next page. It was prepared by Lieut. Commander Richard Barry, U.S. Navy, who was the Executive Secretary of COSATI's Information Sciences Technology Panel. [1] The chart shows six panels (Operational Techniques and Systems, Information Sciences and Technology, Education and Training, International Information Activities, and Information Analysis and Data Centers); the Task Groups on National Information Systems and on Legal Aspects Involved in National Information Systems. Panels were considered to be of a continuing nature; task groups terminated on the completion of their terms of reference. The writer of the Navy publication article took some liberty in showing various agencies as sponsors. COSATI did not consider a particular agency responsible for the activity of any of the COSATI panels or task groups. Indeed, panel chairmen came and went, in some cases frequently. The title of the article, COSATI Coordinates Inter-Agency Information Systems was only partially true. It coordinated interagency programs; that was true, but it focused more on coordination of total agency programs. Nevertheless the organization chart is a useful portrayla of COSATI's key programs in early 1967.

The Navy publication article also presented a government-wide spreadsheet that showed Federal agencies with important STI programs. The chart was a couple of years old when it appeared. The involvement of Congressional and National Academy of Sciences-National Academy of Engineering information programs is also shown.

Both of these charts reveal the special status that COSATI and scientific and technical information programs enjoyed during the 1960s. The status of the OST STI program is also described in an article by William E. Small: [2]

> "We are essentially a staff outfit," says one OST staffer. "If we try to manage any one show, it's scientific and technical information - that's the one where no other agency takes a lead role, but even here we wouldn't want to claim the role of being a line, operating agency. OST is a spokesman for the President."

Small disclosed that in addition to studies undertaken in response to assignments

[1] Barry, Richard E., USN, Committee on Scientific and Technical Information Coordinates Inter-Agency Information Systems, Navy Management Review, Office of Management Information, NAVSO P910, Vol. XII, No. 4, April 1967, pp 3 to 14.

[2] Small, William E.,McGraw-Hill Washington Bureau, Hornig and the OST, the First 1,162 Days, Scientific Research, April 1967, pp 62-67.

CHART I

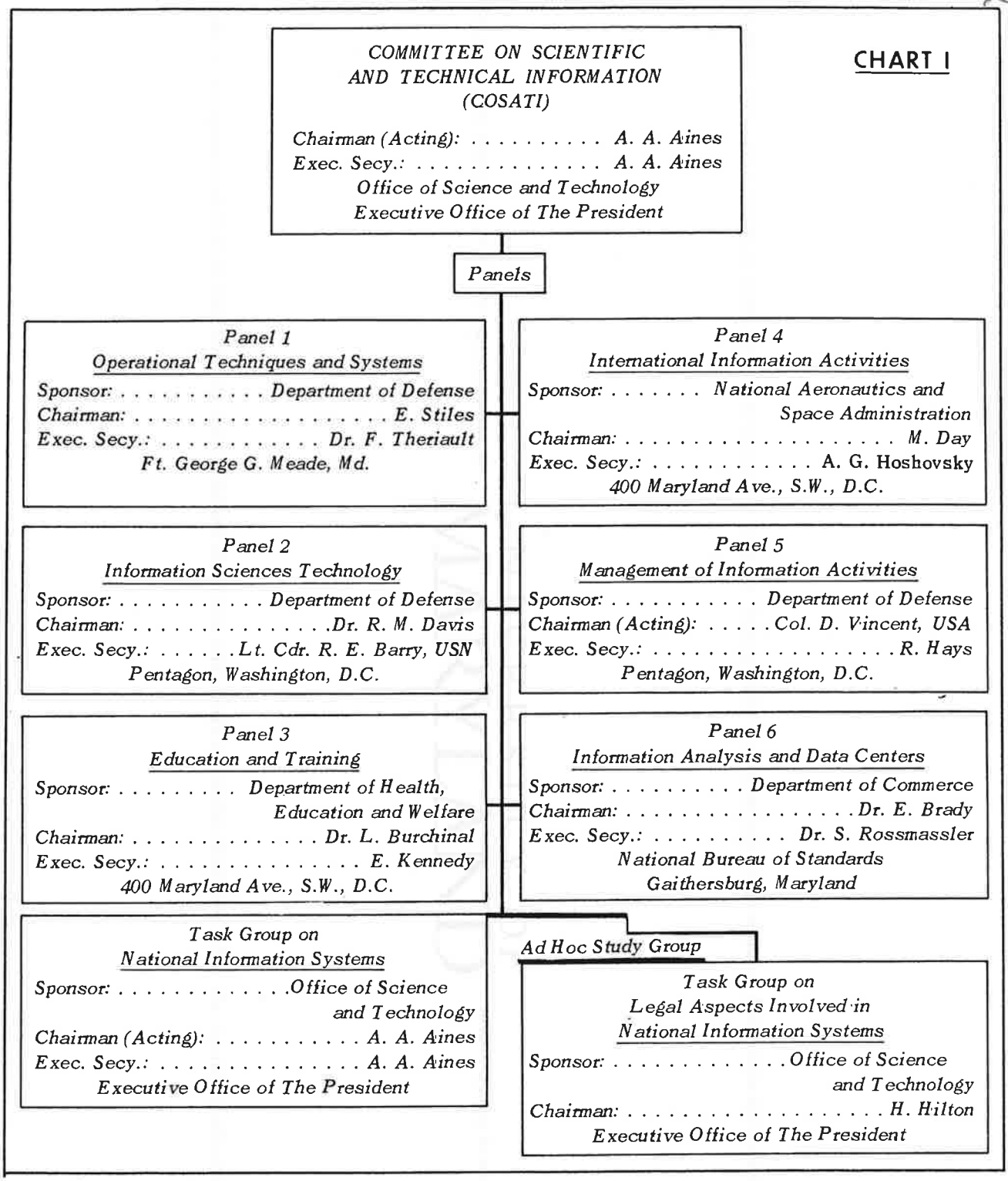
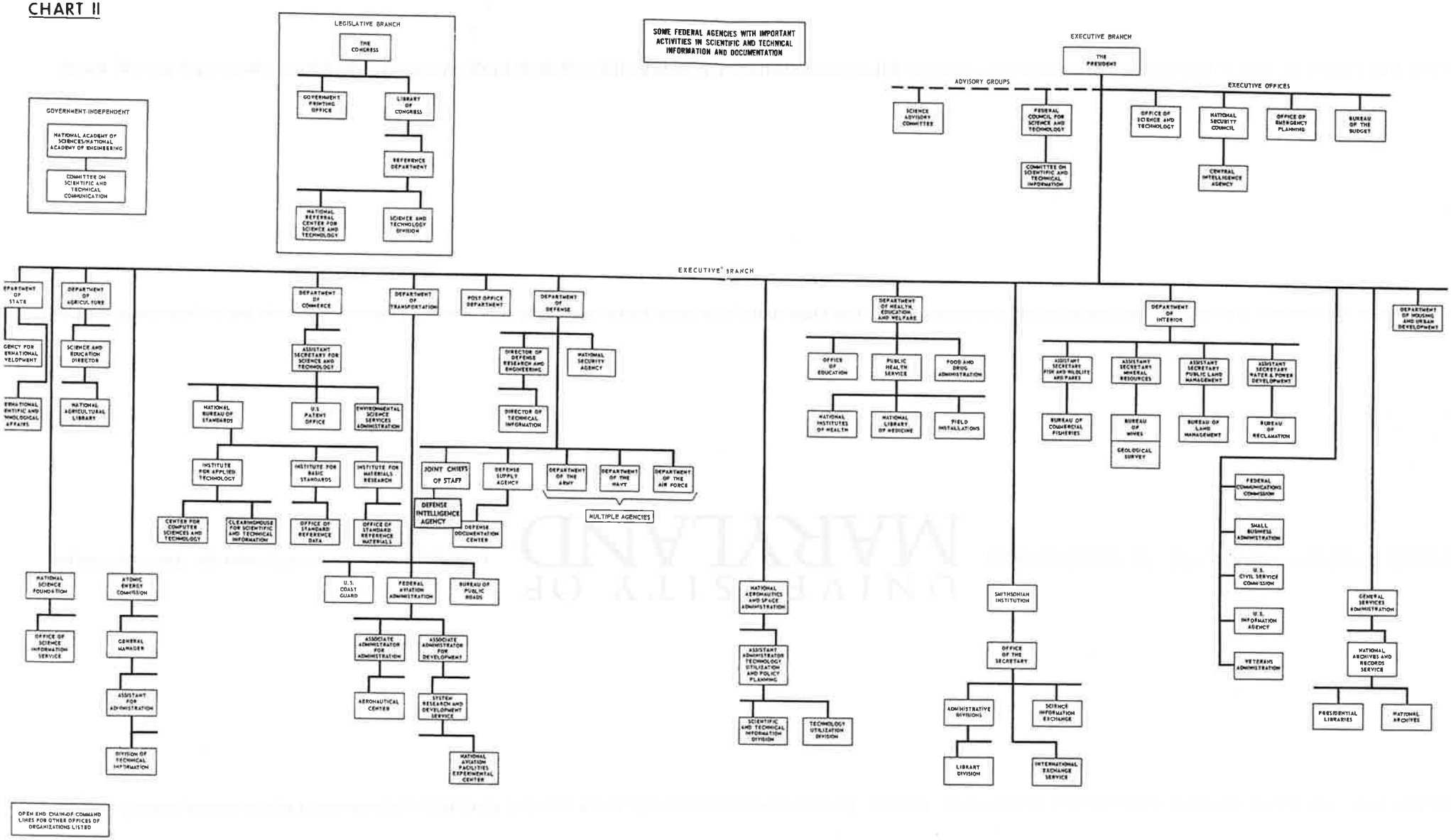

COMMITTEE ON SCIENTIFIC AND TECHNICAL INFORMATION (COSATI)
Chairman (Acting): . . . . . A. A. Aines
Exec. Secy.: . . . . . A. A. Aines
Office of Science and Technology
Executive Office of The President
Panels
Panel 1
Operational Techniques and Systems
Sponsor: . . . . . Department of Defense
Chairman: . . . . . E. Stiles
Exec. Secy.: . . . . . Dr. F. Theriault
Ft. George G. Meade, Md.
Panel 2
Information Sciences Technology
Sponsor: . . . . . Department of Defense
Chairman: . . . . . Dr. R. M. Davis
Exec. Secy.: . . . . . Lt. Cdr. R. E. Barry, USN
Pentagon, Washington, D.C.
Panel 3
Education and Training
Sponsor: . . . . . Department of Health, Education and Welfare
Chairman: . . . . . Dr. L. Burchinal
Exec. Secy.: . . . . . E. Kennedy
400 Maryland Ave., S.W., D.C.
Panel 4
International Information Activities
Sponsor: . . . . . National Aeronautics and Space Administration
Chairman: . . . . . M. Day
Exec. Secy.: . . . . . A. G. Hoshovsky
400 Maryland Ave., S.W., D.C.
Panel 5
Management of Information Activities
Sponsor: . . . . . Department of Defense
Chairman (Acting): . . . . . Col. D. Vincent, USA
Exec. Secy.: . . . . . R. Hays
Pentagon, Washington, D.C.
Panel 6
Information Analysis and Data Centers
Sponsor: . . . . . Department of Commerce
Chairman: . . . . . Dr. E. Brady
Exec. Secy.: . . . . . Dr. S. Rossmassler
National Bureau of Standards
Gaithersburg, Maryland
Task Group on
National Information Systems
Sponsor: . . . . . Office of Science and Technology
Chairman (Acting): . . . . . A. A. Aines
Exec. Secy.: . . . . . A. A. Aines
Executive Office of The President
Ad Hoc Study Group
Task Group on
Legal Aspects Involved in
National Information Systems
Sponsor: . . . . . Office of Science and Technology
Chairman: . . . . . H. Hilton
Executive Office of The President

CHART II


SOME FEDERAL AGENCIES WITH IMPORTANT ACTIVITIES IN SCIENTIFIC AND TECHNICAL INFORMATION AND DOCUMENTATION
LEGISLATIVE BRANCH
THE CONGRESS
GOVERNMENT PRINTING OFFICE
LIBRARY OF CONGRESS
REFERENCE DEPARTMENT
NATIONAL REFERRAL CENTER FOR SCIENCE AND TECHNOLOGY
SCIENCE AND TECHNOLOGY DIVISION
GOVERNMENT-INDEPENDENT
NATIONAL ACADEMY OF SCIENCES/NATIONAL ACADEMY OF ENGINEERING
COMMITTEE ON SCIENTIFIC AND TECHNICAL COMMUNICATION
EXECUTIVE BRANCH
THE PRESIDENT
ADVISORY GROUPS
SCIENCE ADVISORY COMMITTEE
FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY
COMMITTEE ON SCIENTIFIC AND TECHNICAL INFORMATION
EXECUTIVE OFFICES
OFFICE OF SCIENCE AND TECHNOLOGY
NATIONAL SECURITY COUNCIL
CENTRAL INTELLIGENCE AGENCY
OFFICE OF EMERGENCY PLANNING
BUREAU OF THE BUDGET
EXECUTIVE BRANCH
DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
INTERNATIONAL SCIENTIFIC AND TECHNOLOGICAL AFFAIRS
DEPARTMENT OF AGRICULTURE
SCIENCE AND EDUCATION DIRECTOR
NATIONAL AGRICULTURAL LIBRARY
DEPARTMENT OF COMMERCE
ASSISTANT SECRETARY FOR SCIENCE AND TECHNOLOGY
NATIONAL BUREAU OF STANDARDS
U.S. PATENT OFFICE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
INSTITUTE FOR APPLIED TECHNOLOGY
CENTER FOR COMPUTER SCIENCES AND TECHNOLOGY
CLEARINGHOUSE FOR SCIENTIFIC AND TECHNICAL INFORMATION
INSTITUTE FOR BASIC STANDARDS
OFFICE OF STANDARD REFERENCE DATA
INSTITUTE FOR MATERIALS RESEARCH
OFFICE OF STANDARD REFERENCE MATERIALS
DEPARTMENT OF TRANSPORTATION
U.S. COAST GUARD
FEDERAL AVIATION ADMINISTRATION
ASSOCIATE ADMINISTRATOR FOR ADMINISTRATION
ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT
AERONAUTICAL CENTER
SYSTEM RESEARCH AND DEVELOPMENT SERVICE
NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER
BUREAU OF PUBLIC ROADS
POST OFFICE DEPARTMENT
DEPARTMENT OF DEFENSE
DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
DIRECTOR OF TECHNICAL INFORMATION
NATIONAL SECURITY AGENCY
JOINT CHIEFS OF STAFF
DEFENSE INTELLIGENCE AGENCY
DEFENSE SUPPLY AGENCY
DEFENSE DOCUMENTATION CENTER
DEPARTMENT OF THE ARMY
DEPARTMENT OF THE NAVY
DEPARTMENT OF THE AIR FORCE
MULTIPLE AGENCIES
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
OFFICE OF EDUCATION
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION
NATIONAL INSTITUTES OF HEALTH
NATIONAL LIBRARY OF MEDICINE
FIELD INSTALLATIONS
DEPARTMENT OF INTERIOR
ASSISTANT SECRETARY FISH AND WILDLIFE AND PARKS
BUREAU OF COMMERCIAL FISHERIES
ASSISTANT SECRETARY MINERAL RESOURCES
BUREAU OF MINES
GEOLOGICAL SURVEY
ASSISTANT SECRETARY PUBLIC LAND MANAGEMENT
BUREAU OF LAND MANAGEMENT
ASSISTANT SECRETARY WATER & POWER DEVELOPMENT
BUREAU OF RECLAMATION
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
NATIONAL SCIENCE FOUNDATION
OFFICE OF SCIENCE INFORMATION SERVICE
ATOMIC ENERGY COMMISSION
GENERAL MANAGER
ASSISTANT FOR ADMINISTRATION
DIVISION OF TECHNICAL INFORMATION
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ASSISTANT ADMINISTRATOR TECHNOLOGY UTILIZATION AND POLICY PLANNING
SCIENTIFIC AND TECHNICAL INFORMATION DIVISION
TECHNOLOGY UTILIZATION DIVISION
SMITHSONIAN INSTITUTION
OFFICE OF THE SECRETARY
ADMINISTRATIVE DIVISIONS
LIBRARY DIVISION
SCIENCE INFORMATION EXCHANGE
INTERNATIONAL EXCHANGE SERVICE
FEDERAL COMMUNICATIONS COMMISSION
SMALL BUSINESS ADMINISTRATION
U.S. CIVIL SERVICE COMMISSION
U.S. INFORMATION AGENCY
VETERANS ADMINISTRATION
GENERAL SERVICES ADMINISTRATION
NATIONAL ARCHIVES AND RECORDS SERVICE
PRESIDENTIAL LIBRARIES
NATIONAL ARCHIVES
OPEN END CHAIN OF COMMAND LINES FOR OTHER OFFICES OF ORGANIZATIONS LISTED

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from the President, OST also tackles studies on its own - that is, its director's - initiative. A number of these, Small adds, have , at least in part, helped set public policy during Hornig's tenure. These include a report on the post-Apollo space programs,voluminous reports on pollution, jet aircraft noise, effective use of the sea, and:

> Another PSAC report made recommendations for a more effective government-wide system of handling toxicological information and as the basis for a Presidential directive to Secretary Gardiner (DHEW) to establish such a system. And FCST's Committee on Scientific and Technical Information (COSATI) has issued a series of reports on how to cope with the information explosion, which, step by step, is moving the government toward better control of information storage and retrieval.

Addressing the subject of manpower for OST, Small wrote:

> After three years of holding the line on staff growth, Hornig is asking Congress for eight more full-time professionals....three of which would be engaged to deal with the problems of handling scientific and technical information, making this one of the largest single groups in OST -- but not as large as (the) national security (group).

Although Hornig's request to Congress was not successful,his bid testifies to the importance of science communications in the OST schema. Little's observation about the government moving toward better control of information storage and retrieval did not materialize with the failure to implement the recommendations of the National Systems task group. With the disappearance of COSATI some years later, the government-wide effort to dramatically upgrade STI programs began to grind to a halt.

As reported in SCIENCE Magazine, a study of OST, which was completing its first five years of existence, was made at the request of the Military Operations Subcommittee's chairman Congressman Chet Holifield (D-Calif).[1] [2] Dr. Edward Wenk, Jr., chief of the Science Policy Research Division, Library of Congress, was a former member of the OST staff and knew the OST and FCST turf well. The subject of scientific and technical information received a thorough going over by Wenk and his fellow writers. All

[1] Nelson, Bryce, White House Science Office: Report Urges Expanded Role, Science, 7 April 1967, pp 50-51

[2] Wenk, Edward, Jr., Donnelly, Warren H. and Bates, Dorothy M., all from the Science Policy Research Division, Library of Congress, Study of the Office of Science and Technology for the House Military Operations Subcommittee, House Government Operations Committee, U.S. Congress, March 28, 1967. pp 326.

of the members of the OST staff were asked by Dr. Hornig to comment on the Wenk report. This was done in a memorandum from Aines to Hornig. [1] One section of the report dealt with Congressional Interest in S T INFO. Excerpts of the report in the form of answers to criticisms and recommendations follow:

> In 1960, all agencies agree that there was an urgent need to make STI availble to government agencies and the science community, but some agencies have not done all that they should.
>
> > Response: Improvements have been made, but there is still room for improvement. In July 1967, Moss Act on Freedom of Information will go into effect and there may be inquiries about progress. A COSATI ad hoc committee on Freedom of information is being considered, whose task it will be to recommend guidelines that will make possible consistent agency programs to respond to queries for STI, also to study ways to minimize administrative restrictions on unclassified technical information and data.
>
> Establish a strong Federal policy on prepublication charges.
>
> > Response: This was done. NSF is looking into results of this action largely because of growing costs and the possibility of abuses.
>
> Strengthen the Science Information Exchange.
>
> > Response: Single agency funding under NSF were incorporated. SIE's role under study as a result of FCST willingness to develop uniform project-reporting practices. Two mangement studies on subject were undertaken in the last two years by NSF for OST. Preliminary findings were critical of DIE management and practices.
>
> Improve central documentation center efforts.
>
> > Response: The Clearinghouse for Federal Scientific and Technical Information was formed for this purpose as part of Department of Commerce. CFSTI now is a contractor to disseminate DOD's unclassified reports. CFSTI having trouble getting funds from Congress, making it necessary to release some personnel and but services. Congressional help is needed here.
>
> Need better data of Federal STI costs.
>
> > Response: In 1964, COSATI"s survey showed an estimated cost of $400 million a year for Federal STI activities. Subsequently, NSF picked up the task, but it was not entirely successful. The COSATI Task Force on Management of Information Activities was asked to take over with help from NSF. The problem is that most agencies do not have a line item for STI, nor are they organized to gather STI cost data. OMB should institute a program that would require line item accounting in keeping with its programming-planning-budgeting program.
>
> Improve the technology transfer program.
>
> > Response: There is no government-wide program to employ research results. The program has not had high priority. The COSATI Panel on

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Subject: Comments on Library of Congress Report on OST, 13 April 1967, pp 10.

> Information Sciences Technology has completed an inventory of 1,300 projects and will maintain an updated list at the Defense Documentation Center. Some progress is expected in this area, but not across-the-board.

Other recommendations: an internal review of its STI program by the Department of Defense; strengthening analyses and projects dealing with scientific manpower, increasing the role of professional societies; more "teeth" for COSATI and stronger STI focal points in each agency; a master plan for the coordination of agency programs; a determination if there are too many agency STI programs; coordination of national and international conferences to prevent overlap in the participation of government scientists; review of restrictions on the flow of information between agencies; increasing attention to Federal STI programs on the part of all congressional committees, convening a White House Conference on Scientific and Technical Information; increasing attention to STI by NSF; implementation of recommendations of the Baker, Crawford and Weinberg committees. Each of the recommendations in the Holifield Report was discussed in Aines' report to Dr. Hornig and progress noted. With the termination of OST and FCST in 1973, a "deep freeze" on STI programs resulted in the disappearance of COSATI and its programs to achieve STI progress. In effect, there is no central body in the Federal government currently to monitor and control Federal STI programs. Many of the findings made by Wenk and the other CRS study team members are still valid almost 20 years later.

As COSATI's National Systems Task Force pressed ahead in its exploration of the the needs and problems of a proposed national system for document-handling in science and technology, it was acutely aware that Senator John L. McClellan, Chairman of the Subcommittee on Patents, Trademarks and Copyrights, Committee on Judiciary, was holding hearings on S.597, a Bill for the General Revision of the Copyright Law, Title 17 of the United States Code. During hearings in the House on the same bill (H.R. 2512), it was noted that the question of using copyrighted materials in computerized systems was only touched on lightly. This worried OST because the way copyright protection might be handled in the revision could influence the future course of education, med-

icine, science, and technology in the United States. For this reason, Hornig wrote to Senator McClellan, expressing some views on the subject. [1] Said Hornig:

> The proposed legislation would make input into automated information storage and retrieval systems an infringement of copyright. The problem is that we have recognized in many ways that progress in education in science and technology depends on the rapid and effective storage, dissemination, handling and processing of information. The computer is essential to advances in information processing, and it would be tragic, indeed, if the potential of this powerful tool were to be unduly blunted by copyright restrictions that are incompatible with the best and most effective uses of computers for this purpose. The central problem is to provide students, research and other professional workers full use of the copyrighted materials while assuring equitable compensation to the copyright holder and avoiding restrictive and inhibitive controls.

The Executive Branch, he pointed out, was concerned because of some of the programs it was working on could be affected, programs in education, computer-aided instruction, and the automation of the handling of scientific and technical information, going on at the National Library of Medicine as one example. Hornig listed these as follows:

> Regional and national dissemination of medical data, diagnostic techniques, and drug information...
>
> Rapid dissemination of toxicological information to decrease the incidence of adverse drug reactions.
>
> Transferring the results of R&D to industrial and commercial applications under the State Technical Services Act.
>
> Maintaining or improving the quality of educational instruction...
>
> Sharing of library resources in both rapidly developing pupulation areas and remote regions.

Information handling techniques that could be affected included:

> Computerized data banks of individual and derivative works, with repackaging of the material in the computer when it is drawn out for different uses.
>
> Facsimile transmission of unique holdings to remote locations.
>
> Rapid dissemination of information automatically selected to meet the needs of individual users.
>
> Search of mechanized sources of information and text from individual consoles.
>
> Programmed instruction -- with active interaction between the student and the computer.

Hornig concluded his letter by suggesting that the McClellan Committee extend its

[1] Hornig, Donald F., Director, Office of Science and Technology, Letter on S. 597, a Bill for the General Revision of the Copyright Law, Title 17, U.S. Code, to Honorable John L.McClellan, Chairman, Subcommittee on Patents, Trademarks, and Copyrights, Committee on Judiciary, U.S. Senate, April 7, 1967, pp 4.

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hearings briefly so that it could learn firsthand how the proposed bill might affect the major Federal information activities serving the health, defense, industrial, educational and basic research needs of the country.

As now, in the mid-1960s there was considerable concern expressed by scientists about secrecy of research undertaken for the Federal government. One example involved the Fellows of the 4400-member American Anthropological Association. [1]

> By a 12 to 1 margin, leading American anthropologists have adopted a policy statement that says scholars in their field should keep away from secret Government intelligence work...Nearly two-thirds of the Fellows returned the ballots mailed out in January, and the margin of approval was 729 to 59.

Anthropologists consider foreign field studies vital to their discipline. Their concern "crystallized two years ago with the furor of Project Camelot, financed by the Army through American University to study the possibility of civil war in Chile."

Some of the highlights of the policy statement:

> Constraint, deception and secrecy have no place in science. The international reputation of anthropology has been damaged by people claiming to be carrying out anthropoligical studies when actually pursuing other ends. Some anthropologists have used their professional standing and the names of their schools as cloaks for the collection of intelligence information and for intelligence operation. Scholars ought to think twice about accepting even innocent contracts from the Defense Department and other mission-oriented branches for fear of losing access in future research. Unless Congress declares war, colleges and universities should not get into studies not related to their nomal functions of teaching, research, and public service.

Upon receiving the information explaining the policy of the Fellows of the American Anthropological Association, Aines wrote to Hornig. [2] Based on the views of the Anthropolical Association and others like it, "COSATI is considering formation of a Task Group on the Dissemination of Information, under Colonel Currie Downie, Office of Areospace Research, U.S. Air Force. Dr. Harvey Brooks, Harvard University, and others in academe and professional societies, who have shown concern about Federal information practices would approve our formation of the COSATI Task Force." Aines

[1] Reistrup, J.V., Staff Writer, Washington Post, Subject: Anthropologists Vote 12 to 1 to Oppose Joining in Secret Intelligence Work, 21 April 1967.

[2] Aines Andrew A,, OST, Memorandum to Dr. Donald F. Hornig, Subject: Formation of COSATI Ad Hoc Group, 21 April 1967, pp 1.

explained the reason for the Task Group:

> We have to determine what steps can be taken to reduce the administrative drag on the free dissemination of unclassified information resulting from the government's R&D programs. We want to examine practices of the agencies that inhibit and lubricate the flow of research information and to prepare a set of recommendations that will result in improved programs. The task group will be cautioned to avoid getting into areas that are inhabited by the intelligence community. From time to time, Presidents and others in the government call for the need for free flow of knowledge. Hence, it would be timely to form a low-pressure group to look into the subject. At the least, we may be able to come up with a general statement of principles and sufficient uniformity so that agencies will be spared the embarrassment of sharply differing procedures which tend to increase vulnerability.

Not only did the senior officals of COSATI meet with individual professioan societies, from time to time they met with several at a time. This gave COSATI an excellent opportunity to interchange views with the non-profit community of the private sector; it also gave the professional societies an improved aopportunity to meet with one another in the presence of a more or less neutral group. The phrase more or less is used because most of the COSATI officials were scientists and engineers themselves, often members of the American Chemical Society, American Institute of Physics or a similar society. One such meeting was held in the Spring 1967. [1] While the Board of Directors, American Institute for Physics, acted as hosts, there were invitees from SATCOM, American Chemical SOciety. and biological society groups. Aines talked about the COSATI programs, including the National System effort. Dr. Edward Brady, National Bureau of Standards, discussed the National Standard Reference Data System and its relationship to the international CODATA program. A CAS official expressed concern about a possible IRS decision that would affect the tax-exempt status of one of the publications of his organization. He also expressed the view that the term national systems should be played down because close to 60 percent of CAS "business" came from abroad. Cairns, Chairman of SATCOM, expressed his belief that more attention should be given to informal communications by groups in and out of government. He extended informal communications to include the human aspects of communications. From

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject; AIP Meeting in New York City, 16 April 1967, pp 2.

these observations, Cairns switched to online information services wondering if they would or could be supported by individual users in light of the costliness of electronic services. He was cognizent that there was too much overlap between physics and biological astracts and need for something to be done about it.He directed Byron Riegel of CAS to form a group to interact with NLM in the toxicological area. (Cairns was also the chairman of the American Chemical Society, thus in the position to order Riegal's actions.) Cairns was hopeful that SATCOM would be funded after 1969, when NSF funding ceased. These are examples of the subject-matter of the meeting and a sample of how COSATI both informed and listened. In future years, meetings of this nature diminished. Today, the private sector laments that it has no Federal government group with knowledge and authority to listen to its concerns or seek to help. In turn, the government has no sustained ability to interact with the private sector as both sectors evolve during a period of considerable change in the way science communicates and uses information.

One of the realities that struck those who were involved in the affairs of OST and FCST, as well as leaders in the private science and technology sector, was the lack of a body of U.S. science policies that could be referred to as new problems, issues and challenges arose in Federal and national science and technology. Put another way, a compendium of hard or soft policies that were extracted from the experience of scientific and technological leaders on a day-to-day basis was lacking. One government scientists who felt the need strongly was Dr. Sidney Passman. [1] Passman called for a more orderly, rigorous and continuing treatment of the growing and highly significant body of information in the broad field of science policy. Said Passman:

> Just as it has proven effective in other discipline and mission-oriented technical areas, the concept of a specialized information and analysis center would appear to offer a potentially valuable tool. I have discussed this matter with a number of related institutions...and it appears to me that FCST ought to undertake a study of the potential role of such a resource to the Executive Branch and its relationship to other involved communities.

[1] Passman, Sidney, U.S. Arms Control and Disarmament Agency, Memorandum for Dr. Donald F. Hornig, Director, OST, Subject: Need for a Science Policy Information and Analysis Center (SPIAC), March 6, 1967, pp 2.

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Battelle Memorial Institute was a pioneer in this area, having put out a document that inventoried government science and technology policies for several years. Passman stated, "I anticipate that Battelle, pioneers in the information and analysis field, will be making a detailed technical proposal along these lines in the near future."

The suggestion was discussed with Passman and members of the OST staff. It was finally set aside because there appeared to be no call for such an information center ithin OST and FCST. Most of us felt that the recommendation had enough merit to at least be studied as Passman suggested. But in the end, the lack of priority and some kind of proof or expectation that having such a center would make a contribution was its undoing. However, the original premise of Passman that an organized center where individuals and groups could find out what was government science policy at any given time would be a step forward. My own feeling at the time was while the creation of such a center would provide evidence to show that top science and technology managers cared about better management, they would be suspicious that there were hidden traps and future embarrassments in sanctioning its establishment in or out of the government. There would also be a resource problem -- who would pay for the establishment and maintenance of a new center for science policy information.

In the STI policy area, COSATI had no such "hang-ups," recognizing that while there was no overwhelming evidence that a formal center should be set up, it nevertheless issued a policy paper on the foreign dissemination of STI by the Federal agencies. [1] The sense of the policy was as follows:

> To establish a uniform set of policies governing the dissemination of scientific and technical information to Foreign States and etitities, so that the best interests of the United States may be served by individual or collective activities of the U.S. Federal agencies.
>
> The STI referred to is defined as unclassified, unlimited, non-proprietary covering both the natural and social sciences releasable to foreign countries.

[1] Day, Melvin S., et al, COSATI Panel on International Information Activities, Subject: Policies Governing the Foreign Dissemination of Scientific and Technical Information by Agencies of the U.S. Federal Government, May 12, 1967, pp 5.

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Policy statements of this document apply to all U.S. international activities concerned with STI, and specifically include international bilateral or multilateral exchanges and agreements, acquisition of foreign documents, foreign dissemination of U.S. STI reports and serials in both full copy and microform; exchanges of machine indexes, machine software, specialist information personnel; and utilization of foreign machine systems.

The policy statments in the paper apply to all Federal agencies and are designed

To ensure that there exists within the United States at least one accessible copy of each signficant publication of the worldwide scientific and technical literature.

To establish international STI systems through wivh the worldwide scientific and technical literaure will flow routinely into the U.S. elements of the systems.

To influence and encourage the establishment of foreign information systems compatible with those of the U.S.

To utilize STI effectively in support of agency missions, and in support of overall U.S. objectives in raising the economic and industrial standards of other nations.

To continue the growth of English as the primary world language for communication and publication in science and technology.

A summary of the actual policies are as follows:

1. Agencies shall obtain an equitable return from foreign states and entities in exchange for U.S. Federally controlled STI in the form of publications, information, materials, services, or money, but shall be as nearly as possible equivalent in value, taking into account the capability of the foreign entity concerned.

2.Agencies shall refrain from widespread free distribution of STI to foreign states, entities, and individuals, except that the agencies will supply or distribute STI which may be required in support of specific foreign policy objectives...

3. Agencies will give first consideration to cooperation in STI with multilateral organizations if such organizations provide a means at least equal to bilteral arrangements in meeting U.S. objectives.

4. Agencies will promote agreement on the use of English for scientific and technical communication and publication throughout the world.

5. Agencies will promote the presence of qualified Americans in the offial structure of international organizations concerned with STI

6 When agencies have reason to believe that their planned international activities may influence over-all international relationships of a polical, technical or other nature, prior coordination should be effected through the Department of State.

7. Agencies shall maintain adequate lists and statistics on international exchanges so that progress towards U.S. objectives may be estimated yearly.

The policy document was accepted by FCST so that all of the FCST community agreed to follow its principles. When the FCST was eliminated in 1973, the pact was terminated

2.3.4

ostensibly, although most of the involved R&D agencies probably followed its precepts, which still appear to be reasonable and to the point almost two decades later. With the unwillingness of FCST's successor, the Federal Coordinating Committee on Science, Engineering and Technology (FCCSET), to give any priority to Federal STI matters, the FCST agreement was never updated and re-issued. This became sadly obvious when the Department of Energy, years later, sought to find out from the Department of State and from the Executive Office of the President what the Federal STI policies were.

Quick to learn and quick to follow, it was learned that the Soviet Union had put into action a plan modeled on our National Standard Reference Data System (NSRDS) for the collection, critical evaluation and dissemination of standard reference data. [1] According to Dr. Edward Brady, Director of the NBS-DOC NSRDS program, stated that the Soviet program "is probably about ten times the size of ours." In the meantime, as it had in the House of Representatives, the Standard Reference Data System Bill (S.998) came up for hearings in the Senate. The Office of Science and Technology urged support of the pending act and the increased appropriation to fund the program in Fiscal Year 1968. Dr. Chalmers Sherwin, Department of Commerce, stressed in his testimony that reference data are used by a half-million scientists and engineers with considerable savings in time and money. He also stressed the huge national and international stakes involved and explained why this large scale program could not be undertaken by the private sector. [2] Sherwin stated that the program would not be duplicative with other Federal agency information programs, that no classified data would be in the system, that data would be available for foreign sale, and that there would be no increase in total costs or the need for new facilities. Rather, he expected, funds would be returned to the Treasury. Dr. Cairns, Chairman of the NAS-NAE SATCOM, echoed Sherwin about the inability of the private sector to do the job. He also agreed that a government copyright made sense for the program. William T. Knox, McGraw-Hill, agreed that

[1] Aines, Andrew A., Memorandum to Robert Barlow, OST, Subject: Weekly Report to the President, May 22, 1967, pp 5.

[2] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Senate Hearings on Standard Reference Data System Bill on May 15, 1967, Memo. dated May 17, 1967, pp 1

that the reference data program was worthwhile, but called for more support to the publishing community to disseminate the accumulated data throughout the world.

To what extent were the managers of the three national Libraries: Library of Congress, National Library of Medicine and the National Agricultural Library cooperating? This was the subject of a letter Ronald E. Wyllys sent to the Office of Science and Technology during early 1967. Wyllys was well known to OST and the COSATI community having participated as a member of the Systems Development Corporation team which made recommendations on a national information system for science and technology. Wyllys pointed out that the failure of the three libraries to coordinate their differing cataloging procedures tended to increase the workloads of libraries all over the country. The COSATI chairman forwarded the letter to the directors of the three libraries, asking them what was being done by the three to reduce the workload of the library community. As a result of their responses, Aines wrote to Wyllys: [1]

> I can now report to you that the three library directors are now wearing handsome white hats,are now organizing a common posse to capture solutions to a number of shared problems, and are selecting changing some of their prize stock, capable of developing useful solutions to joint problems. I am convinced that remedial action will flow from their pledges, and I am looking forward to testimony from you in the future when concrete evidence appears in libraries such as yours.

Wyllys must have solved many problems over the years, since he is now the Dean of the Graduate School of Library and Information Science, University of Texas at Austin. Insofar as the three national libraries are concerned, to the extent feasible, they have interacted closely over the years, particularly in areas where they have encountered mutual problems.

In May 1967, there was a mystery that engulfed the OST information staff. Out of the clear, there was a New York Times story, written by Walter Sullivan, about a visit of McGeorge Bundy and a team of "savants" who came to Moscow on behalf of

[1] Aines, Andrew A., Acting Chairman of COSATI, Letter to Ronald E.Wyllys, The Memorial Library, University of Wisconsin, Madison, Wisconsin, May 22, 1967, pp 1.

President Johnson "to discuss ways to improve exchanges of new (technical) information."[1] On the same day, under a Moscow dateline, there was a short item in a Washington Post /column entitled "Around the World" that reported Bundy's trip without mention of VINITI that Walter Sullivan described.[2] From the extent of the detail in the Sullivan article, it was evident that the writer was part of the Bundy party, although there is a possibility that the New York Times "morgue" had an inventory of articles on the Soviet's VINITI, and that Sullivan was able to draw on that resource. Mr. Bundy earlier a special assistant to the President, headed the Ford Foundation at the time of his trip. The article did not identify any of the "savants" who had been part of the Bundy party. The Sullivan article was an interesting melange of information tidbits: VINITI is a vast abstracting service, more accurately called the All Union Institute for Scientific and Technical Information of the Soviet Academy of Scineces. It had,at that time, a scientific staff of 1,000 persons with 22,000 translator-specialists on call. The staff scans 17,000 journals plus 100,000 patents yearly from all parts of the world. More than 800,000 items are earmarked for abstracting. Subject matter is broken down into narrow sub-headings, there being some 1,000 in mathematics alone. When a researcher wants a full article, a copy is sent him within two days. About 1,000 articles are copied and sent out daily. The work, Sullivan reported, is provided only in Russian. The program was costly. Half of the journals were received on an exchange basis, the other half was bought at a cost of about $2,000,000 a year. Subscribers pay about one-third of the cost, the other two-thirds is borne by the Soviet budget. Sullivan goes on to say:

> A visit to the headquarters of the service has delineated both its strengths and its weaknesses. Its leaders do not regard it as the ultimate solution... Its cost is hard to justify; there is a lag of a year in abstracting the the current mathematics literature and five months in chemistry;: the journals of abstracts issued monthly in 25 fields of science are overwhelming to many Soviet scientists...To mitigate the cumbersome process, the 25 volumes issued each month are divided into a total of 160 subdivisions. A theoretical physicist can subscribe to that section of the physics volume which deals only with theoretical physics but he may then miss material on experi-

[1] Sullivan, Walter, How the Russians Deal with the Deluge, New York Times, 22 May 1967.

[2] Anonymous, Washington Post, Bundy Non-Answers, May 22, 1967, Page A-14.

mental techniques that is just what he needs to test a theory.

Sullivan said that there appeared to be genuine interest in some kind of an international program. For example:

> The International Atomic Energy Agency of Vienna, of which the Soviet Union is a member, has devised a method for placing English-language abstracts (mostly fuurnished by the United States.AAA) on magnetic tape for computerized search and printing. Such plans may ultimately solve the problem of extracting from the vast river of current information those special items useful to a particular researcher...Various international approaches to the problem are to be discussed in August (1967) when the International Federation for Documentation meets in Tokyo. The federation comprises some 42 countries plus six associate members.. It is noteworthy that next year's meeting of the federation will be in Moscow.

Sullivan also shed some light on the Soviet Union's attitude twwards cybernetics:

> McBundy and his colleagues were concerned with rrading knowledge about the use of modern information-handling techniques and "systems analysis" in deciding complex issues. The use of computers for sucy tasks - cybernetics - was long frowned on in the Soviet Union. Apparenly it was felt that cybernetics represented a threat to Marxist-Leninist control of decision-making. Now the pendulum has swung to the oth er extreme and cybernetics is much favored.

The Washington Post article said nothing about the Bundy trip to VINITI. Instead

> Ford Foundation President McGeorge Bundy completed a week of talks with Dzermen M. Gvishiani, deputy chairman of a Soviet science committee,and other scientists. He was discussing with Gvishiani, Premier Kosygin's son-in-law, a proposed international center for research on problems of industrial societies.

The reason why the brief article in the Washington Post was entitled "Bundy Non-Answers" came from the second paragraph of the item:

> Asked if friction over Vietnam entered the talks, Bundy said, "No political issues were raised in formal talks, but they were referred to informally." Asked to elaborate, he said, "I've given you as much of a non-answer as I care to on that question."

Aines sent a memorandum to Dr. Hornig, after reading the two news clippings, asking how it was possible that the President would send a team of "savants" to the Soviet Union "to discuss ways to improve exchanges of international information" without our being involved. The answer was that on December 15, 1966, there was a White House announcement of the President's assignment to Bundy, who gave a background briefing to reporters. OST was not closely involved, but Bundy and Hornig talked about the mission once or twice. The general idea was to talk about aome kind of a center for the study of common problems of industrialized societies.

This explanation in no way dissipated the mystery. Except for the two clippings, we were still at a loss to understand what the trip to VINITI was all about. What Sullivan wrote about VINITI was very well known to OST and COSATI. No report ever came from Bundy discussing his trip to VINITI. Who accompanied him on the trip was not disclosed. VINITI got press notice, which probably pleased the Soviets. Sullivan wrote a balanced article, pointing out what was good and what was bad about VINITI. He also acted as a conduit for the Soviets, who have been and still are most anxious to see international STI conduits established on which they can draw. In subsequent years, the Vienna-based International Atomic Energy Agency's mechanized information system was labelled a USSR-supported device to make information available to them, not obtainable through other sources. McGeorge Bundy, whose name has not been famous in science communications' circles,nevertheless did make a contribution in 1970, when he appeared as the keynote speaker at the 11th Meeting of the House Committee on Science and Astronautics' Panel on Science and Technology. [1] His thoughtful comments are well worth reading by information scientists and managers.

Has science outgrown the learned journal? This is the question that Robert Colburn asked just about the time NIH decided to jettison the IEG program. [1] Said Colborn:

> When an innocent-seeming correspondence system can shake the machinery of science publication it suggests that the way science is done may have outgrown the ways science is communicated...The sight of something spontaneous and informal and imaginative being stamped upon by the science Establishment is an unpleasant one. Last Fall, editors of five of the established learned journals covering the fields involved (electron transfer and exidative phosphorylation) announced they would not publish papers which had already been circulated through an IEG.

Colburn had reservations, however, because it was possible that the a journal would not last long if a large share of its readers were IEG members. The process of editorial weighing and refereeing of papers must introduce delays. If the process continued, journals could move directly from the printing press to the library, the first step to the loss of support of the journals. At best, they would be archival,

[1] Bundy, McGeorge, President, Ford Foundation, Keynote Address: Some Thoughts on Managing Knowledge to Save the Environment, Presented at the 11th Meeting with the Panel on Science and Technology, Committee on Science and Astronautics, U.S. House of Representatives, January 27-29, 1967, pp 8.

and information would flow through other channels. Continued Colborn:

> I am not sure whether science really has outgrown the learned journal. Certainly there is a widespread feeling that the machinery of information flow is inadequate and major changes are needed. It is also obvious that the IEG approach -- providing rapid, unevaluated, and therefore voluminous communication -- is no substitute for the journal. By its nature, an IEG must be limited to a small specialized group if it is not to drown its members in documents; so its tendency is to fragment communication.
>
> I don't pretend to know where the IEG ought to fit. It is clearly a potent device with repercussions perhaps wider than its developers fully realize. It may be no more than an expensive luxury for a handful of favored investigators, parasitic on the existing publications machinery. Or it may be the key component of a future information-flow system appropriate to a large-scale worldwide science enterprise. Or the forerunner of one. I do believe that its role needs throughtful and reasonably public examination -- and that it ought not be killed off arbitrarily on trivial grounds.

The IEG experiemnt is now a memory; no other government agency sought to emulate it. While the government did not seek to play a major role in using new information technology to speed up the process of communication which made the IEG so popular, it did encourage research on the process, mainly through NSF grants, for a few years after NIH terminated the program. The consensus of government STI experts was that if there was to be a change in the way learned societies handled the process, they should instigate the changes, not the government. To the credit of the professional societies, a number of experimental efforts have been undertaken in recent years to quicken the flow of STI.

On 11 April 1967, the House of Representatives passed Section 106, H.R. 3512 with amendments. This section reserved the exclusive rights of the copyright owner in the reproduction of his or her work for input or storage in an information system. Unfortunately, no testimony was offered by any government agency on the impact to the proposed copyright revision on the computer usage of copyrighted material in national education programs or on the problems of national information systems. This brought widespread concern among interested groups from education, science and government who met with OST on May 19, 1967 to discuss the implications of the copyright bill.[1]

[1] Aines, Andrew A., Memorandum to Robert Barlow, OST. Subject: Weekly Report to the President: Copyright Bill, Item 4, page 3, May 22, 1967.

The concern of the attendees was that the revised Copyright Law would be written to protect the interests of publishers and not necessarily authors. EDUCOM felt very strongly that this would happen. It was evident to the OST staff that the positions of the various attendees were somewhat fixed, depending largely on economics and expectation of future participation in programs involving computerized information networks or databases.

There was hardly any reaction from the Subcomittee on Patents, Trademarks and Copyrights to Dr. Hornig's Letter of April 7, 1967 onS.597, Bill for the General Revision of the Copyright Law, so COSATI formed an Ad Hoc Task Group on Legal Aspects Pertaining to National Information Systems under Dr. Howard Hilton, Department of State. The task force was asked to make a rapid study in time to be useful to the Senate subcommittee from two vantage points: first, Federal STI operations and second, private sector information activities with respect to "modern, networked information systems for handling information in sciences and technologies. Further, the terms of reference for the ad hoc task group directed the following tasks: [1] (Annex A, page 22)

1. Delineate signficant present and future issues with respect to the letter and practice of the constitutional provision and copyright law.
2. Draft a proposed policy position paper for COSATI.
3. Recommend specific additions, deletions or revisions in the present copyright law or the pending revision.
4. Recommend other actions or mechanisms regarding authorship and information availability which would better serve the interest of any of the involved sectors and estimate the impact on each sector of each such action.

The task force, pleading the lack of sufficient time to fulfil all of the requirements of the terms of reference, came up with a rather unorthodox report, but one full of information and suggestions. Some of the highlights of the report follow.

1. Scientific, technical and economic progress and the the international competitive posiion of the United States depends on the ready access to information as well as its effective use. As the means of disseminating information develops through technological progress, we must

[1] Hilton, Howard J., et al, COSATI Task Group on Legal Aspects Involved in National Information Systems, FCST, Subject: The Copyright Law as it Relates to National Information Systems and National Programs, July 1967, pp 80.

be assured that legal procedures, which may be necessary today in balancing the interests of the copyright owners in compensation with those of the users, continue to keep pace with the technological advance in the use of published information.

2. Users (of computerized information systems) are willing to pay for the copyrighted material that they contain, (but) they fear that the permissions procedures of copyright law, by imposing upon them the burden of contacting each individual copyright owner to secure permission to use his material, may impede the development, or restrict the use, of information storage and retrieval systems.

The ad hoc task group found considerable experimental and planned activity, which may make the locating and supply of printed information to all parts of the country as quick and efficient a process as is the transmission of music or entertainment at the present time. Mentioned was the work of the National Library of Medicine, DOD, DHEW, NASA, UCLA Medical Center, and EDUCOM as examples of the trend.

3. A commission to study the problems of copyright law as it applies to computers and information systems should be established.

4. The input into information systems not used for profit should be exempt during an interim period from the requirements of the copyright law.

5. Abstracts as derivative works presents real problems for information systems using such abstracts.

6. What constitues fair use and "single copy" availability needs to be more fully described.

7. Since the use of computers and "information banks" for storage and retrieval may to some extent replace the sale of books and journals, there is general agreement that in most cases the payment of some copyright compensation should be required But, at what point in the process...should compensation be charged? Probably when copyrighted material emerges in written form (on paper or on a screen), but not when it is transmitted from computer to computer.

8. Refraining, during the moratorium, from charging a copyright royalty at the input stage will not significantly effect publishers' or authors' royalties.

9. If computers replace books or journals, they will not do so on a large scale for several years. If we believe that the present school exemption represents a fair balance of conflicting interests, the proposed revision's "not for profit" exemption should be broadened.

COSATI accepted the Hilton panel report, and it found its way to the Senate Subcommittee attached to a letter from Dr. Hornig and through the Registrar of Copyrights, Library of Congress, who was sitting in with the COSATI ad hoc task group while the study was going on. It is difficult to assess the full impact of the study on Congress, but it certainly brought to the attention of the McClellan group that scientists and engineers would not accept copyright law changes that would seriously affect their information systems.

In his letter to Senator McClellan, [1] Dr Hornig wrote:

> The Federal Council for Science and Technology has had the problem of the copyright law as it related to the transfer of scientific and technical information and to Federal programs under intensive care by a task group of its interagency Committee on Scientific and Technical Information (COSATI). I am transmitting the study of the Ad Hoc Task Group on Legal Aspects involved in National Information Systems...as a background discussion paper to assist the formulation of public policies in this important area. As such, it has not been adopted by the Federal Council for Science and Technology. ..(The) use of copyrighted works in information storage and retrieval systems raises serious problems for the development and use of new information transmission systems and technologies (in such areas as) health,education, space, atomic energy, and defense. (The issues are sufficiently complex that their resolution required further studies to reconcile the various interests involved.

Hornig then suggested that S. 597, be amended, insofar as it provisions apply to the use of copyrighted works in information storage and retrieval systems

> To afford additional time to develop a satisfactory formula for assuring adequate incentives for authors and publishers while promoting the most rapid introduction of new information systems for research and education This should not delay the timely enactment of S. 597.

Hornig suggested the following course of action:

1. Establishment during this session of Congress of a commission to study the problems of copyright protection in relation to new technology in information handling. I note that your are favorable to the creation of such a commission, and we would be pleased to assist the Committee in drafting a bill to this end. Enclosed for your consideration is a possible alternative to the draft bill prepared in the Copyright Office.
2. Inclusion in S. 597 of a provision for an interim method of dealing with the use of copyrighted material in information storage and retrieval systems, particularly in experimental systems for research and education, that will ensure unimpeded access to such material under conditions that would preserve the rights of the copyright holder pending the submission of the study commission's report.

It is difficult to assess the full impact that Hornig's letter and the COSATI report had on Congress, but it certainly brought to the attention of the McClellan Subcommittee that scientists and engineers were rapidly establishing information systems that took advantage of new information technology and that they would not meekly acquiesce to changes in the copyright law that severely inhibited the free flow of scientific and technical information.While FCST did not approve the COSATI report, the Chairman of FCST thought it important enough to forward to Congress.

[1] Hornig, Donald F, Chairman, Federal Council for Science and Technology, Letter to Honorable John L. McClellan, Chairman, Subcommittee on Patents, Trademarks and Copyrights, Committee on Judiciary, U.S. Senate, July 22, 1967, pp 7.

At a Conference of Biological Editors, held in New York City in May 1967, Aines who moderated a panel on the copyright problem stated on this subject:

> In the copyright bill'brouhaha',we can see how the publishers are arrayed against the educators, who, at least in part, are aligned with computer groups, and arm-in-arm with planners of computerized information systems. All use the backdrops of their own professional group outlook to play their individual roles. There is nothing ignoble about this. After all, in science, technology, education -- you name it -- the improvement of information systems is bound into the general program of improvement each espouses. Where it gets sticky is in the development of national systems, especially when outfits in the public and private sectors are concerned. Obviously, there has to be accommodation, willingness to enter discussions and workable agreements, if we are going to make progress. The problem of hardware will be less an issue...than getting strong-minded gentlemen to settle for less than they would like or their supporters would appreciate.

The five-year old COSATI,despite all of the problems inherent in being an inter-agency committee without intrinsic powers of its own, except for "agreement" on the part of its member agencies to follow consensus actions, nevertheless was showing a growing understanding about all phases of scientific and technical communication. This was particularly true in the Task Group for National Systems for Science and Technology, which began to see the scope of its overall task in clearer perspective. It began to differentiate the elements of the total system with growing clarity - the document-handling system; the scientific and technical data system (as differentiated from the literature-handling programs); the emerging data-base and information networks system; and the basic and long-standing staple of scientists and engineers, the oral and information communication system.

The National Systems task group recognized its responsibility to study all vital communication links in the national research and development program, thus set about to find a way of examining informal communications among the nation's scientists and engineers and the nationwide systems for hanlding of scientific and technical data. Both of these studies were supported by the Advanced Research Projects Agency of the Department of Defense. The first of these - the oral/informal communications study, was undertaken by the American Institutes of Research, Silver Spring, Maryland. The principal investigator was Dr. Warren E. Graham. DARPA's representative was the Army

Research Office, Durham, North Carolina. The Army Research Office was a component of the U.S. Army Office of the Chief of Research and Development (OCRD). The announcement of the two studies said of the AIR study: [1]

> The purpose of the study is to obtain a clear description and definition of the role played by information communications techniques. It will also pave the way for later measuring of various aspects of the national iffort in informal technical communication.

In further describing the study, Aines wrote: [2]

> No study of science communications could be complete without a sound understanding of the role played by informal or oral communications among scientists and engineers. Not fully understood at this time is the way that this mode will be influenced by the approach of computerized information networks, which make possible console entry into computer memories from remote locations. It is understood today that the oral communication mode is the most popular means used by many scientists and engineers, probably becuase it is the most traditional and the easiest to use at this point in time. Whether or not there will be significant changes is not known, but to get a better understanding a contract study was undertaken,..a decision will be made about its future use and dispositon.

The final report of the American Institutes for Research team was completed in August 1967. Here are some of the highlights from the study: [3]

> For the purposes of the study, informal scientific and technical communications were defined to include oral communications, such as lectures, discussions, telephone conversations, technical meetings, social gatherings, written memoranda, proposals, and pre-publication papers. Excluded: formal publications designed for mass dissemination.
>
> Discussions were held with 106 chairmen and directors of research and with 326 project directors recommended by the chairmen and directors. Approximately 2,000 titles in the general area of scientific and technical communications were scanned. Of these, 300 documents were examined. About 35 of these contained extended discussions of information scientific communications of an informal nature.

Graham and his associates summarized the results of the document search and found an overwhelming set of conclusions indicating that oral/informal communications are the most desirable form of gathering knowledge. Some of the researchers quoted include Beckett (161), Taylor (1962), Rubenstein (1961), Robertson (1961), Menzel (1951), Maizell (1960), Glass and Norwood (1959), Garvey (1965), Shilling, Bernard

[1] Office of Science and Technology, Executive Office of the President, Two Studies of Technical Data Communications and Handling, For Immediate Release, September 27, 1966, pp 2.

[2] Aines, Andrew A., OST, 1967 Review - Scientific and Technical Information,

[3] Graham, Warren R, Wagner, Clinton B., Gloege, William P. and Zavela, Albert, American Institutes for Research, Exploration of Oral/Informal Technical Communi-

and Tyson (1964), Aims (1965) and Libby (1959). A characteristic finding was that of Fishenden (1959) who: [1]

> determined the methods that 63 researchers considered most effective in bringing information to them by using interviews and diary cards. Eleven percent used personal recommendations as a source of information. The 63 who contributed diary cards indicated that nearly 30 percent of their task-related information was acquired orally. Twelve percent of the diary card items were based on either oral or written private communication. In 21 percent of the task-related searches a colleague was the first source of the information. In more than half of the task-related searches, research personnel utilized colleagues, personal files, and local departmental sources as their first source of information.

Chapter VIII of the report contains the problems and recommendations that were written up by Warren Graham. There is no evidence that his associates participated in the preparation of this section of the report. Before plunging into the problems and recommendations, Graham stated that his study was undertaken "as a precursor to a nation-wide survey of research scientists and engineers. It should not be surprising, therefore, that many of the recommendations that follow concern needed intensive studies that can now be carried out on the basis of data contained in this report." There may have been some personal discussions with Graham about undertaking a nation-wide survey of researchers, but there is no record of such a plan. Now to a summary of his recommendations.

> Communication Technology. The AIR team found that researchers had difficulty in using the telephone to call fellow researchers long distance. This, they recommended, should be rectified. When tables, charts or parts needed to be involved in a research discussion, the telephone is inadequate. The recommendations called for a systems study witha view toward establishing a nationwide communications network for research scientists and engineers.

The marriage of computer and communications, the growth of data bases and networks, the employment of communication satellites and other technological gains are making this recommendation implementable technically. Costs are another matter.

> Television and Recording Facilities. Closed circuit television broadcasts (should) be studied as a potential means of increasing audience sizes (in-

[1] Fishenden, R.M. Methods by Which Research Workers Find Information, In Proceedings of the International Conference on Scientific Information. Washington, D.C., National Academy of Sciences-National Research Council, Washington, D.C.,1959

cluding the possibility of setting aside UHF, satellite and closed circuit TV channels). A feasibility study be made to determine if technological and cost problems can be overcome for establishing an audio and tape library system for recording and preserving speeches and proceedings concerning research specialties. Consideration should be given to a nationwide system of low-cost travel tours to selected universities. Expansion and generalization of systems for exchanging researchers be undertaken, including greater use of sabbatical leaves.

Consultations. Need directories for information concerning whom to consult, especially when questions are related to other disciplines. Directories with this information are often insufficient and out-dated. Needed is a central index of research advisors covering disciplines, previous research, present address and telephone numbers. The government's informal research information services need to be better publicized.

Informal Information Exchange. In certain disciplines, the number of preprints is becoming excessive, review and theoretical papers are included without necessity, and many who could profit from the exchanges are not included. Recommendation: a study of current science news services and preprint services to establish a system that coordinates newsletter dissemination of news about research in specialities and a central preprint repository that can supply copies of draft reports on request.

National Security. Studies be made concerning the consistency of classification requirements and procedures and the rapidity with which declassification can be accomplished after security classification is no longer needed. Need a more rapid "need-to-know" clearance procedure acceptable among all government services. Researchers need to be trained in methods to obtain classified information. For young researchers, usually left out of classified information procedures, there should be classified symposia on classified matters in their fields of interest.

Proprietary Interests. To reduce the effects of restrictions stemming from national security and proprietary requirements, recommend a policy of wide-open exchange of research information, also cross-licensing such as exists in the electronics industry. Also recommended: Compensation and reward policies that sustain the "publish or perish" philosophy be reviewed and revised to improve methods of evaluating researchers' productivity and to reduce trivial information output.

Costs of Informal Research Communications. There should be accounting studies on national samples to establish accurately the direct and indirect costs of informal research communications.

Unexpected Research Events. Contingency funds should be established to enable quick responses to unexpected problems, such as new developments and needs fror basic research uncovered during applied research.

Meetings, Conferences and Courses. Each national research organization (should) be provided with the support necessary to determine and solve its own problems concerning informal information services for its members, and that a study be made of universities to determine what is needed to enhance their role in post-graduate training and in sustaining researchers' efforts to remain up-to-date in their specialties.

Contract Administrators: There should be increased effort to have research contract administrators especially selected and trained in dealing with creative research and that they should be aided by disinterested specialists from universities or institutes established for this purpose.

Many of the recommendations of the AIR team headed by Graham have been implemented in whole or part over the years, but in the main the study did not receive very much attention when it was completed. Even AIR did little to adevertise and disseminate the report, which was made available at the Na t ional CLearinghouse for Scientific and Technical Information (now NTIS). Because most of the recommendations could only be implemented by the private sector scientists and engineers, there was little incentive for the Federal sponsors to undertake additional studies in this genre. The OST officials also took a passive attitude in regard to it as they sought to gauge the extent of resources they would have to implement the natioanl information system approach. The study team did not anticipate the explosion of small computers that is in evidence today that adds a new dimension to informal, as well as formal, communications among scientists and engineers. At the time of the study, expanding the use of the conventional telephone for scientists appeared to be good facilitation and an opportunity for breakthroughs in science communications. When the scientific informat ion community in the public and private sectors get around to measuring the health and place of informaal and oral communications some time in the future, they will find this study a useful early blueprint for progress.

One of the unique programs of COSATI was the prepara tion of guidelines and standards for information handling and retrieval in the absence of programs of this nature in the private sector or in other parts of the government. The motive force for this endeavor was necessity and it is to the credit of COSATI and its parent body, the Federal Council for Science and Technology, that government officials "rolled up their sleeves" and set out to get the job done. [1] The other members of the subpanel were: Donald D. Davis (Atomic Energy Commision), James L. Eller (DHEW), John B. Forbes (USDA), Terry Gillum (DOD), Charles W. Hargrave (NASA), Margaret S. Hicks (DOC) and

[1] Janaske, Paul C. (chairman) et al, Sub-Panel on Classification and Indexing, Panel on Operational Techniques and Systems, Committee on Scientific and Technical Information, Guidelines for the Development of Information Retrieval Thesauri, First Edition, 1 September 1967, pp 9.

Richard S. Angell (participant from the Library of Congress). Their product took hundreds of hours to prepare, so difficult was it to obtain the necessary knowledge of what was needed and the consensus of the agencies. The team explained in the Introduction:

> Recent developments in the methodology of information storage and retrieval and the establishment of new information centers have given rise to the creation of many divergent and incongruent subject-indexing vocabularies. The important differences are not those of subject coverage, but of basic philosophy of terminology development and presentation. These differences were brought about because,although the basic requirements were similar in many cases, there existed no generalized statement of fundamental principles of vocabulary selection and utilization that could be adapted to specific indexing and retrieval situations. The applications of these guidelines will tend to reduce the disparities that have grown up among the various operating information systems in the intitial stages of development. The principles are sufficiently general in nature to be applicable over a wide range of subject disciplines and throughout many variations of specific system requirements.[1]

Those who have watched the increase in price of government-produced documents in recent years will wince when they read that the "Guidelines" booklet was available from the Superintendant of Documents for 15 cents. The document is, by now, out-of-print, but may be still available in the National Technical Information Service, which unlike the Superintendant of Documents's Government Printing Office, acts as an archival service.

As OST and COSATI searched for ways to improve Federal and national STI programs, a small cloud began to appear that hung over the expectation for increasing the stewardship of the Executive Office of the President in future STI matters. This was described in a memorandum to Dr. Hornig:

> The quickening trend towards computer-based information systems is reflected in requests for more dollars, more talent, more research and development, regardless of the type of system involved. The demand for Federal funds by both the government and the private sector is increasing, and in science and technology alone well in excess of a half-billion a year is being invested by the Federal agencies. The rate of increase is expected to continue for the next few years. The

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Issue Paper to be Discussed with Charles L. Schultze, Director, BOB, 4 October 1967, pp 3.

> deep involvement of OST and the Federal Council is not matched at the Bureau of the Budget, which has not assigned a person with a full-time responsibility to assist in the coordination of programs and to provide a BOB focus in this field at the same time.

Why is the need increasing? In addition to increased growth of information systems, more money is being spent,national and international programs are accelerating, better data about programs and costs are needed from the agencies, and deficiencies in agency programs need to be overcome. The growing involvement of government in social engineering reveals the powerful role of communications processes as a tool, a means of finding facts, and a way to provide feedback to the government.

Where, specifically, do OST and COSATI need BOB's help, in addition to gathering data about their STI programs?

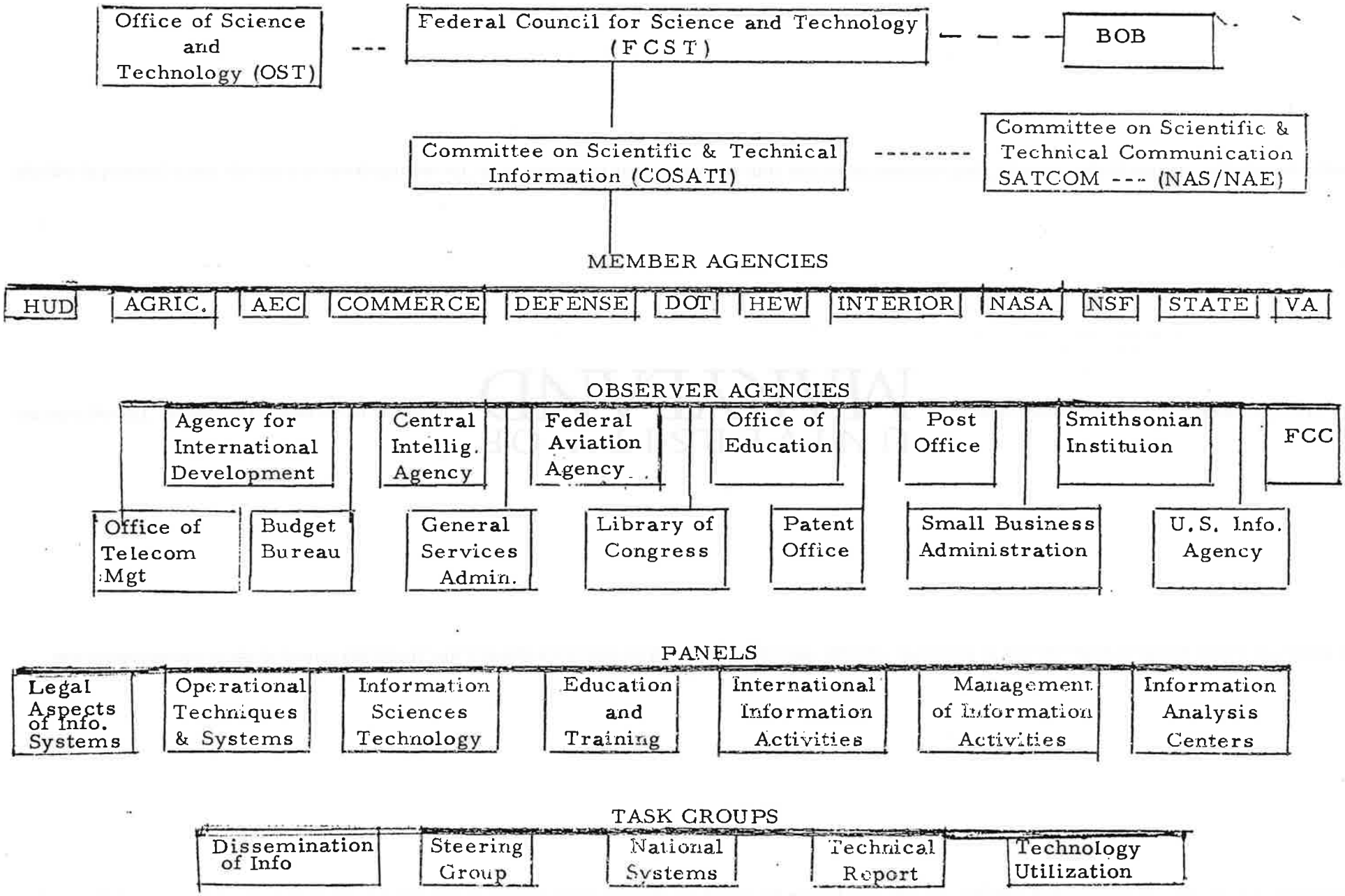
> To accompany OST-COSATI on agency STI stewardship reviews.
>
> To help us obtain an STI budget line item at each agency.
>
> To put pressure on the agencies to assign high level STI focal points responsible for planning, programming, budgeting within their agencies.

OST and COSATI fully appreciated the power and authority of BOB, since neither of the two had real directive power over the actions of the agencies. Aines pointed out that it would be fatal to the COSATI STI program if the agencies began to detect a diminishment of interest in Federal STI programs and BOB's commitment to them. There were a few small signs that BOB examiners, not too knowledgeable about the programs and their value to Federal R&D, were exhibiting reduced enthusiasm as COSATI increased the agencywide program by moving into areas where there was a need for action, remedial, planning or otherwise. The newer budget examiners expressed concern, for example, when they saw the COSATI organization chart, reproduced on the next page. Admittedly, the COSATI program, as the reader can observe, was formidable - a powerful indicator of the arrival of the information revolution and a positive sign that the Federal government in the 1960s sought to cope with it. So anxious was Aines to encourage Hornig to speak to the Director, BOB, that he undertook preliminary discussions with William Carey and Jack Young, Assistant Directors of OMB.[1] Aines wrote:

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject; Weekly Report, 6 October 1967, pp 5

COSATI ORGANIZATION

(October 3, 1967)



> During the week, discussions were held with Bill Carey and Jack Young, Assistant Directors, BOB. I explained the need for better coordination and described some of the programs going on under OST-COSATI leadership. Both stated that they understood the problem and lamented the lack of sufficient staff in BOB to focus on the problem. Prior to their departure, they stated that they would review the problem and see if anything could be done. Here is a case where a stronger push in BOB would help both shops. I hope that you will have an opportunity to mention the need to Charles Schultze, BOB Director

What discussions were held between the Director of BOB and the Director of OST are not known, but the problem was further discussed with Hugh Loweth and Joseph English of OMB - both outstanding public servants deeply involved with Federal scientific and technical programs. The announced subject for discussion was the budget for STI in the NSF. In his report of the meeting to Dr. Hornig, Aines summarized some of the discussion as follows.[1]

- To help NSF staff, the OST national systems planners need to provide guidelines covering the roles for government and non-government information systems.
- There needs to be a decision by Lee Haworth, NSF Director, about forming a new office, under OST, to help develop and support national information systems and subsystems.
- NSF and the professional societies were not doing enough to plan for a reduction of Federal support after a reasonable period of subsidization.
- Plan for no increase in support of the Science Information Exchange pending the launching of a contract study on project reporting.
- OMB needs to improve its involvement with OST and COSATI information programs. Sporadic interaction is not working in light of the enlarged programs of COSATI and OST.
- OST will not be able to assume full responsibility for its own program and for the new national information programs for science and technology that it has been asked to undertake without increased staffing.

After these two discussions with BOB officials, it was becoming evident that it would be increasingly difficult to get additional resources, manpower and funds, for Federal STI programs, this despite friendly and sympathetic statements. This was only a small cloud covering the face of the sun at this time. There appeared to be no effort at BOB to appoint a knowledgeable information expert and the problem was

[1] Aines, Andrew A., Memorandum to Donald F. Hornig, Subject: Weekly Report - Meeting With BOB, 22 September 1967, pp 3.

compounded when Joe English took on a new post at the National Gallery of Art. New examiners were assigned to give the OST-COSATI information programs a split part of their attention, but they never showed his depth of understanding and support. Continuing budget reductions ordained by the President gave them an opportunity to challenge all actions and programs of COSATI. Although Loweth continued to play a major role in BOB R&D programs, his subordinates never took the time to understand the importance of Federal STI programs. It bode ill for the future, insofar as STI was concerned. It would take another decade before OMB would bring full-time staff aboard to work on information matters, but the accent would be on privacy and computers for the most part, not on STI and its communications.

The support that Don Hornig gave to his technical assistants, charged with scientific and technical information management was reflected in his performance before the Senate Appropriations Committee's subcommittee on appropriations for independent ffices. The House Appropriations Committee had cut OST's FY-1968 budget from $1.8 to $1.4. Said the Scientific Research reporter: [1]

> Three years in Washington have made of chemist Donald F. Hornig a resourceful politician - if he was not one already when he came here from Princeton.

Hornig stressed the current role of OST and pointed out that the additional funds were needed for the broadened activities it was undertaking, more specifically for a staff expansion from 38 to 56 permanent positions. One of the needs was for a stronger STI program. Hornig said:

> The information framework now consists of an elaborate system of journals, abstracts, reports, libraries, and information centers that are gradually being overwhelmed by the size and complexity of the job. Until an adequate system is devised, properly organized and utilizing the best available technology, we will not get our money's worth from the national annual investment of $23 billion in R&D. We have not paid enough attention to the problem of making information available in useful form when the user needs it, and at reasonable cost....Every increase of 1% in the efficiency of the process is worth $250 million per year at present expenditure levels...Although the direct expenditure of the federal government on its various STI

[1] Writer unidentified, Scientific Research, September 1967, Subject: Hornig Fights for Larger Budget, pp 36-37

> services already exceed $400 million per year, there is no place in the government outside of the Executive Offices of the President where information problems and their solutions can be considered as a whole, where the total activities of government can be assessed in relation to the activities of private industry, or where policy with respect to essential common specifications for the numerous information systems can be set. Someone has to keep the separate efforts from going off in all directions. The OST will engage only in the minimum core of work relating to policy, overall planning and ratification of standards. Everything else will be done in agencies outside the Executive Office. We plan to carry out the function with four professional people - plus secretarial support.

While the reporter commended Hornig for his performance before the subcommittee on appropriations, the needed spaces were not forthcoming, unfortunately, but the point

o page 56

In the September 1967 issue of Scientific Research, the recently released COSATI report, The Copyright Law as it Relates to National Information Systems and National Programs, prepared by the Hilton Panel, was reviewed by an unidentified writer, who said among other things:

> Last month, in a long-awaited report, a task force of the Committee on Scientific and Technical Information proposed that during an interim period of three years, input to information systems not used for profit should be exempted from the requirements of the copyright law. Since such systems are in a developing stage, exempting them from copyright liability should not deprive copyright owners of significant amounts of revenue. At the same time, an exemption will gurantee that research in this area is not hindered in any way by a requirement that users of the system must secure permission from a copyright owner before they many use copyrighted materials... The COSATI task force unabashedly equated the solution of the computer-copyrights problem to the continued development of the U.S. as a world technological leader...It would be tragic indeed if the potential of the powerful tools (computers, cathode ray tube, and microphotography) were to be unduly blunted by copyright restrictions that are incompatible with the best and most effective uses of this technology for the benefit of the public welfare.

made by Hornig about separate efforts going off in all directions had much to do with what he did not want to see happen in the Federal information community. The national information system for science and technology was a refinement over and above a successful Federal STI program. When the latter began to unwind or remain static, the opportunity of gearing up to a national STI program began to disappear. It was un-

1 Author unidentified, Scientific Research, September 1967, Subject: COSATI Offers Interim Compromise on Computerizing Copyright Data, page 37.

fortunate that the Science Advisor to the President, who wanted so much to improve Federal and national STI programs,would run into a road block both in Congress and the Bureau of the Budget. Hornig's interest in STI, for example, was further indicated in reading testimony he gave to a congressional committee during that time period on the need to introduce computers and computing into the country's schools, colleges, and universities. [1] Hornig started out by reading a passage from the report of the President's Science Advisory Council, Computers in Higher Education (bibliographic reference on page 2 of this section, 2.3.4):

> Computers and computing have already fantastically increased our power to know as well as do. They have made masses of data which were previously completely intractable accessible to analysis and understanding. They have made it possible to trace the consequences of theories and assumptions in a wide diversity of fields. As coomputers and computing have become more powerful, they have invaded wide areas of industry, government, and the professions. Computers launch and guid missiles and antimissile missiles. Computers aid in engineering design, they control machine tools and chemical processes, they keep books, control inventories, and make out payrolls. In the production of newspapers and books, computers are used in alphabetizing and correcting text, and in justifying and hyphenating lines of type. Computors are used in the retrieval of medical information and in the analysis of voluminous business, social and historical data. Indeed it seems that the social and economic gains which can be made through the use of computers and computing may be limited chiefly to the availability of people who are able to apply these tools in new and useful ways.

Later in his testimony, Hornig addressed the subject of information storage and retrieval and under this heading, he told the Subcommittee:

> As the pace of accumulation of knowledge has accelerated it has become increasingly difficult for users of knowledge to avail themselves of what amounts to a flood of information. It seems clear that in the computer we have the essential element that will not only save us from inundation but will allow us to make use of information more effectively than ever before. The computer provides new means to store, index, analyze, sort and disseminate information rapidly, and what has already been done makes it apparent that computers are leading to developments that will have as much effect on the handling of infomation as did the introduction of the printed book. The National Library of Medicine is already computer-based and prints out the Index Medicus, a title list of articles from 2,500 medical journals, 24-hours after the deadline date. It can find articles according to key words mentioned in the title on demand. Computers are at the heart of the Defense Documentation Center. The AEC operates a computer-based Technical Information System. NASA operates a number of computer-based information systems, including the Scientific and Technical Aerospace Report - a complete compu-

[1] Hornig, Donald F., Director Office of Science and Technology, Statement Before the Subcommittee on Government Activities, House Committee on Government Operations, July 20, 1967, pp 16.

> terized bibliographic service and a Selective Dissemination Service--a computerized system for compiling information tailored to the needs of specialized scientific and engineering groups. Experiments in how scientists make use of a computer-based library are going on at Project MAC at MIT. Plans are already being laid for a national network of computer-based information systems spanning all of science and technology. It is clear that the use of the computer in handling information will be a major development of the next decade, and that this in turn will profoundly affect education in ways that we are just beginning to explore.

The well-rounded approach that Hornig took, almost 20 years ago, is now being better understood in the world of education. He was also correct in extolling the progress that he saw in the future. But he would have been disappointed in the lack of progress that is being made in the STI area, which was so instrumental in initiating early developments in the knowledge-handling field. Comparing what he tried to do in the STI area to his successors' efforts, puts him heads and shoulders above them. Not only did he support the improvement and harnessing of computers, but he also stood firmly behind programs that would exploit the full capabilities of new information technology in science, technology, education, and all programs that were based on the generation, handling, retrieving and disseminating of information. Hornig was a committed man.

Only rarely did the question about "turf" arise in dealings between COSATI and the Congress. Usually, this was quickly straightened out after a conversation. Such was the case when a member of Jack Brooks' staff, serving the House Government Operations Committee, Ernest Baynard, inquired about what Chal Sherwin and his/OST task group on standards were doing, since the Brooks Act had turned this function over to the Bureau of the Budget and the National Bureau of Standards. Baynard protested that OST was a policy group and should not be involved in such an operation. If BOB and NBS were not getting the job done as called for in the act, they should be brought up to the requisite level to make this possible. He was about to write a memorandum to Congressman Brooks, he stated, and he wanted to get the "facts" before he did so. A meeting was held between Baynard and Aines a week later. It was explained to Baynard that in no way was OST competitive with the Federal agencies, that its basic concern was to improve scientific and technical information and communication programs, not getting into standards programs. Thus, it was an ad hoc effort, not a raid on turf. Baynard

2.3.4

was given a description of the larger OST-COSATI crusade to upgrade the Federal STI program. He expressed surprise and asked why the program had not been more widely publicized and suggested that Hornig made a presentation to the House Government Operations Committee. He was told about our small staff and the lack of time to publicize the extent of the White House effort. He was particularly impressed by the report of the Task Group on National Systems and the inventory of information sciences technology projects produced by Dr. Ruth Davis and her panel. [1,2]

During the same period, [2] a meeting was held with Rep. Emilio Daddario and Phil Yeager an aide who was a congressional information "stalwart" for many years. Unlike the meeting with Baynard, which initially had the stamp of confrontation, although ending amicably, this was a meeting on a proposed House of Representatives-Smithsonian series of symposia on scientific and technical information. Daddario wanted to get the advice of OST before embarking on a program that could turn out to be a fiasco or a waste of time. Smithsonian authorities had "jumped the gun" and had brought Dr. Frank Fremont-Smith in from the New York Academy of Science to act as program manager to undertake a series of programs in 1968 that would be jointly funded by the House and Smithsonian Institution. Daddario was bothered by a divergence in aims. He felt that Smithsonian was only interested in discussions and general recommendations, while he wanted as his goal meetings that would result in proposals for legislation. He was also concerned that the meetings would focus substantially on such topics as: crime prevention, oceanography, and pollution, which were getting plenty of attention in other fora, and less on information problems and issues, many of them already identified. This concern was shared by Bill Knox and Andrew Aines, as well. The latter stated his view that while this might be a problem, there would be advantages in getting Smithsonian more deeply into a long-term program dealing with the diffusion of scientific and technical knowledge in accordance with its charter. The careful selection of the advisory group

1 Aines, Andrew A., OST, Memorandum: Weekly Report, submitted to Dr. Donald F. Hornig, 14 October 1967, pp 4.

2 Aines, Andrew A., OST, to Dr. Hornig, Director OST, Subject: Weekly Report, 21 October 1967, pp 5.

could include individuals interested in seeking legislation. It seemed likely that Mr. Daddario had already concluded that Congress not be involved as a partner of the Smithsonian Institution for stated and other reasons. The hope that Smithsonain would "go it alone" was dashed. Many months of discussions brought no fruit and the subject was dropped.

From the start, COSATI expressed its interest in the full spectrum of scientific and technical information matters, from the generation of new knowledge,at one end,to the application of knowledge,at the other. It was agreed by most members that the transfer of technical information for more rapid application was a task of great importance and one that they should engage in with scientists and engineers. Senator Jennings Randolph (D-Va.) also believed that the information community had to be deeply involved and made his views known to OST-COSATI. The Senator expressed some of his views at a conference held in Washington during this period, the 1967 National Conference on State Technical Services. [1] Senator Randolph was at that time the Chairman of the Subcommittee on Science and Technology, Senate Select Committee on Small Business. Following are some of his comments:

> Accomplishing effective transfer is harder than the subcommittee expected, but the potential for economic growth, for regional development, and the solution of new public sector problems appears to be improving. The big need is for high quality personnel who can properly play the role of transfer agent, for measures of costs and benefits, and feedback from users of technology. Such feedback has been disappointing, and without it it is hard to check on the administration of the programs. We need facts and statistics more than anecdotes of success. The value of the knowledge must be intrinsic and demonstrable. The policy of a dissemination center for each state may be unwise, when regional centers might be more appropriate. There is recognition that it may be necessary for agencies turning out STI to bring the new technology up to a transferable status...Rather than a giant centralized repository, a better approach tocompact and store information might be a network of centers each specializing in some field or industry On the dissemination side, there is confusion. A businessman might be contacted by more than one NASA Regional Dissemination Center, or he might be invited to a clinic at an AEA laboratorym or may learn of a State Technical Service activity at a nearby university or an SBA field office. DOD's opening of its information analysis centers to all industry

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F . Hornig, Subject: Report, dated 14 October 1967. pp 6.

> - not just contractors - is desirable,but may add - is desirable, but may add another group to add to the confusion. Perhaps we need a single point of contact for businessmen in each region, which could act as a switching center to put the businessmen in touch with the relevant technology evolving from the Federal R&D programs. The increasing technical content of all manufacturing and commerce is threatening the evolution of small businesses. Acquiring technology is time-consuming and expensive for small business, and we must do this for small business just as big business does it for itself. Moreover,present techniques of dissemination may be too sophisticated for disadvantaged areas. Technology transfer is a valid concept when we consider the $100 billion worth of technology on the shelf and the great need of society to apply this knowledge for its requirements.

Senator Randolph was pleased to learn that COSATI had established a Task Group on Utilization of Information, headed by Dick Lesher of NASA, who was responsible for that function in NASA. James Webb, the administrator of NASA,wrote a letter to COSATI stating that he would make members of his staff available to COSATI for this purpose to accelerate action in this important area./ The senator was also pleased to learn that COSATI had convened a meeting of leading figures from the States involved with the Department of Commerce State Technical Services program. During this meeting,which Paul Grogan,head of the Commerce Office of State Technical Services, helped arrange, concerns were expressed that future funding might be jeopardized. This turned out to be what happened in the future. Aines made the point that there was a lack of strategy on how to tie dissemination of information together with other tools required to achieve take-off. This, too, seems to be a continuing problem. Returning to Senator Randolph, he stated that he would be watching COSATI progress in the future.

Vice-President Humphrey was invited by the COSATI chairman to participate in an upcoming forum on information analysis centers. His answer came in the form of a telegram which is worth recording in this document. [1]

> This is the information I am delighted to convey to your forum on information analysis centers. Continue your excellent progress. It is a pleasure to learn of your meetings toward strengthening the flow of information. I had hoped to be able to accept your kind invitation to meet with you, but my overseas tour makes this impossible. This message is being left for trans-

[1] Humphrey,Hubert H., Vice-President, U.S.A., Telegram to Colonel Andrew A. Aines, Acting Chairman, COSATI, November 3, 1967, pp 2.

> mittal to you prior to my starting out on my travel through what Marshall McLuhan calls parts of the "global village" - Vietnam and South Asia. Information service has come a long way since the hearings I was privileged to hold as Chairman of a Senate Reorganization Subcommittee. But you and I know we do have to keep moving ahead --not just in software and hardware, but in end product -- in user satisfaction. We need to develop an integrated system of service among Federal centers. We need to provide sensitivity to interdisciplinary clienteles of the information when they need it, where they need it, and the way they need it. Please be assured that COSATI's program is a matter of continued deepest interest to me. I stand ready to be of help in every possible way. I want you to call upon me and upon my staff so that together we can serve our President, and advance to new frontiers of information service.

One of the most fascinating persons that the OST-COSATI staff interacted with during the mid-1960s was Doctor Chalmers W. Sherwin, who had transferred from the Office of the Director of Defense Research and Engineering to the Department of Commerce, where he operated as a Deputy Assistant Secretary, largely in research and development. Sherwin became deeply interested in information matters, mostly in standards, in OST. His involvement became confusing to the extent that coordination became a problem to COSATI task groups also working on coordination matters. In a memorandum to Dr. Hornig on the subject, I wrote: [1]

> There is a need to specify clearly what relationship Sherwin's program and status as a consultant have with me and the programs that I am charged with, wearing both my OST and COSATI hats... I have been the recipient of a number of queries from my COSATI colleagues and others asking what is going on and seeking answers I am not able to provide. The lack of communications is distressing and potentially injurious to the Office.

Having thus introduced Sherwin as a controversial figure, what was it that he was doing that stimulated such a reaction to a splendid gentleman and an outstanding public servant, whose "crime" was a desire to solve some difficult coordination and information flow problems? It should be made clear that Sherwin was a scientist who had become interested in information and communication, perhaps accepting the challenge to scientists to become more involved in STI matters recommended in the Weinberg (PSAC) Report (Science, Government and Information that appeared in 1963. Perhaps he became interested in better science communication as a result of his work in DOD or in the Department of Commerce. There may have been other contributing reasons, as well.

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Coordination Problem, 30 September 1967, pp 1.

Whatever the reasons, it appears to this writer that no inside history of what went on in OST during the "glory days" should fail to mention the contributions and other actions of a fascinating person. In a Canadian talk, for example, Sherwin said:[1]

> In thinking about information management, one must keep in mind a key postulate: Information is a Tool of Mission. It ranks along with buildings, secretaries, and laboratory equipment. Therefore, information systems will be internally managed and internally funded by an organization to meet its own needs. This in turn limits the kind and degree of control or coordination which is possible to impose from the outside. Indeed the establishment of standards, common codes, and certain central supporting services are about the only kind of central "control" which is realistic.

In listing the basic properties of standards and common codes, Sherwin stated that

> 1. They must not constrain significantly present or future operations of member systems or of individual ADP centers.
>
> 2. They must be cheap to implement as a fraction of total ADP installation.
>
> 3. The cost savings and other advantages must be obvious, and promise a payoff in a year or two.
>
> 4. An organization of continuous administration is essential.
>
> 5. International compatibility is essential.

Sherwin then called for a proposed network for the exchange of bibliographic descriptions, pointing out that each association of users who has a need to interchange machine language bibliographic descriptions shold have the right to generate and use its own format, but in such a way that the various member networks exchanging such formats are compatible. He then made a specific proposal for exchanging bibliographic descriptions, calling for basic standards (standard coded character set, standard exchange medium, and standard method of identifying and compartmenting any "string" message; system wide standard codes, a set of compatible formats, and establishment of a central national office that would approve basic stands system-wide standard codes and compatible formats. It would also negotiate policy matters with corresponding offices in foreign countries. Sherwin concluded his paper with some comments that underscore his prophetic effect on future networks:

> In conclusion I should like to state that although I have concentrated on a first step in an improved system of keeping track of documents, the really urgent need is to evaluate, organize and compress the knowledge they contain. Experience shows that on the average the critical evaluation of a technical

[1] Sherwin, Chalmer W., Resume of Talk Given at Conference on Data Banks and Remote Computing, Winnipeg, Canada, September 19-20, 1967, pp 4.

> paper by a top expert costs about $100-$200 (1 to 2 professional man-days). The research leading to the document costs about $20 to $40,000 dollars. Finally, a summary evaluation and compression of the key information in a set of related documents can be produced at 1/50th to 1/100th the number of pages compared to the input. What is urgently needed are more centers operating in a research environment manned by part-time research people to produce the needed evaluation and compression of scientific and technical knowledge.

The reader will note that the $100 to $200 costs of experts are far below the current cost quotations for "top" experts and document costs have changed greatly from $20 to $40,000, but Sherwin's analysis is still striking.

A few weeks later, Sherwin prepared another paper on international science information interchange. [1] Here are a few excerpts:

> Few human activities have the diversity and complexity of information interchange. In the science field alone there are some 30,000 specialized journals, probably a still greater number of publishing sources (private publishers, government agencies, corporations, etc.) of over 10^6 significant documents per year. To this diversity of sources, one must add an equal diversity of of intermediate processors, such as the thousands of specialized user-oriented services, secondary publishing organizations, analysis centers, special libraries, regular libraries, etc. Finally, there are the millions of scientists and engineers themselves --the ultimate users -- each with diverse and special interests. The complexity of this array of activities is so staggering that when one proposes "to do something about" the science information problem, one quickly reaches a state of frustration on how to get a useful grasp on the problem. In line with recent thinking, one,of course, proposes the classical "systems approach." A systematic study is to be set up which will invent the final, comprehensive system, and this is to be used as a guide to some sort of phased implementation. To this end, one sets up task forces, working groups, etc., each assigned to one or another aspect of the problem, in the expectation that the collective wisdom and ideas of these groups will somehow fit together into a rational system concept. However, judging from all recent efforts of this type on this problem with which I am familiar, this desired result does not come forth. What happens, rather, is that none of the working groups can get their collective arms around enough of the problem to come up with much more than platitudes. The sum of these task efforts is, inevitably, equally platitudinous, including some vague suggestions for some sort of a coordinating organization with ill defined authority and unknown means of funding. This type of attack has been going on for about a decade or so in the science information field, until one is tempted to believe that this direct "systems-approach" is just not practical. The problem is just too complicated.

Sherwin pointed out that there were more obstacles: the diffuseness of authority and resources, direct control of the mission group over its information processes, and

[1] Sherwin, C.W., Toward an International Science Information System: The Problem of Getting Started, Unpublished,from OST Files, October 9, 1967, pp 8.

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the difficulties central organizations will have in maintaining control. Nevertheless, Sherwin felt that he could provide a strategy that would solve at least part of the problem. He said:

> If the history of science teaches us anything it teaches us that, faced with a large intractable problem one should retreat from a frontal attack, and start by attacking one or two small parts. Each part must (1) appear tractable and (2) if solved, promist to give insight on how to proceed to the next step. It seems to me that the time has come to apply this "piecemeal strategy" to the construction of a rational,international information system.

His first proposal called for the establishment of a unique citation number that would be assigned to each monograph, journal article and technical document at the time of publication. Such a number for books only had been developed in the United Kingdom. His second proposal called for an international basic abstract with only six data elements: his third suggested the sharing of translations; and his fourth proposal called for a microform copy of all documents containing a unique document number. By following the route of tractable problem-solving - taking small bites - Sherwin saw the possibility of progress.

Interestingly, Sherwin did not seek an opportunity to discuss his views with the COSATI National Systems task group, nor did he discuss his antagonism towards the national systems approach with the OST staffers responsible for the COSATI program. This did not appear to faze Sherwin, who prepared yet another document on public goals and scientists and engineers. [1] Scientists and engineers in universities face a rapidly changing world, which is resulting in a number of problems. These include: the size of the R&D esablishment which will continue to rise; high unit cost, amounting to about $50,000 to provide one professional-man year of R&D effort, a rate requiring convincing defense when supported by public money; the dominance and nature of publis support (90% of research and 66% of development investments are made by the Federal government. Three decades earlier, research was mainly supported by philanthropic funds and engineering mainly by industrial funds.); the pay-off time is

[1] Sherwin, C.W. The Coupling of the Scientific and Engineering Communities to Public Goals, Unpublished, from OST Files, October 13, 1967, pp 8.

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too long (Engineering development and technology efforts in the public sector start paying-off in about five years from initiation, while pay-off time in applied research tends to be about 10 years. Pay-off time for undirected research, based on military R&D, tends to be 20 or more years.); the pay-off ratios of the stages of the R&D process are not well understood; universities are discipline-oriented; the rate of production of new fragments of knowledge, represented by "significant" individual papers and reports in science and technology, now exceed 10^6 a year. (A number of different contributions usually need to be related to each other in some manner in order to be effectively utilized. The number of paired associations increases as N(N-1)/2, and the number of triple associations increases as N(N-1)(N-2)/6, etc. Thus as N increases, the "relationship problem" arises much more rapidly.); finally, there is a "translation problem" of interpreting and making more understandable an increasingly sophisticated science to the practical user. To solve the information explosion and other problems, Sherwin advocated that universities should promote institutional support; also promote and operate problem-oriented laboratories or programs; engineers and scientists must develop skill in the economic analyses of their own functions as well as expanding their efforts in the systematic evaluation and compression of knowledge. Although specialized research workers with their "invisible colleges" do not appear to have an information management problem, this is not true of scientists and engineers concerned with catching-up or with using knowledge...Critical evaluation could be done for all of science and engineering simply by deflecting about 1% of the present research manpower into this task. Sherwin concluded that many of the problems for science and technology would be solved if institutional support and program support is increased to universities so as to provide the majority of Federal support, if 1% of the technical manpower is focused on understanding the R&D process, and another 1% on the evaluation and compression of knowledge.

Whether Sherwin's views were right or wrong is irrelevant; he was working very hard to be honest and objective in his views in those days. While he disagreed sharply with the approach taken by COSATI's National Systems task group, he undoubtedly would have

would have applauded the standards work that other panels in COSATI were turning out. A memorandum to Hornig about this time makes the point: [1]

> Chal Sherwin will be pleased to learn that the Library of Congress and Stiles' COSATI Panel on Operational Techniques and Systems have come to a virtual understanding on the format of magnetic tapes. They have agreed that the definition of data elements for books need not necessarily be the same as that of documents, although the tapes themselves need to be compatible. Stiles considers this an important bit of progress. Essentially, the USASI code and a 9-channel tape form the base of agreement. If they are able to wind up this part of the standards effort, Sherwin will find some of the work of his Task G roup somewhat easier. The chore will be to get wider agreements of other non-government and government groups.

In the meantime, Sherwin proposed that an OST Task Group for the Standardization of the Interchange of Scientific and Technical Information be formed. Permission to establish the group was apparently received from the OST "front office." To obtain action, Sherwin held a Pre-Task Group meeting with a number of government representatives. What the purpose of this task group would be was reported by the secretary of the COSATI Panel on Operational Techniques and Systems, who attended the meeting. He wrote: [2]

> At Sherwin's Pre-Task meeting, he announced that the group would consist of 14 persons, seven each from the government and private sectors. The latter group will be selected by SATCOM. It will be an OST ad hoc group assembled to solve a single problem. The government officials will act as individuals rather than agency representatives. The group's objectives are to define and recommend for adoption: a specific, minimal set of Basic Standards; a specific, minimal set of System-Wide Standard Codes; and one or more Compatible Formats, using the Basic Sandards and System-Wide Standard Codes for the purpose of interchange of machine language representations of bibliographic descriptions of journal articles, reports, and monographs.

Theriault further reported that an organizational arrangement for policy-setting and operating functions would be made,acceptable to the public and private sectors, "

> for such administrative and supporting services as may be necessary to make the above Basic Standards, Systemwide Codes, and Compatible Formats useful, and to assist in their orderly future development.

The group would also identify the key problems to be solved to define the standards and to recommend a program to develop solutions and demonstrate practicability. Sherwin also stated his intention to obtain a 4-person staff, two from government and two from industry. His timetable called for a consensus by the end of six months.

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director of OST, Item 14, Weekly Report, 6 October 1967, p. 5.

[2] Theriault, Francis R., Secretary of the COSATI Panel on Operational Techniques and Systems, Minutes of Panel Meeting, held October 19, 1967, pp 6. (Item 7,p. 4)

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In the meantime, agency programs and problems received OST-COSATI attention. An agreement was reached between NSF and the Library of Congress to withdraw NSF funding of the National Referral Center for Science and Technology. It was further agreed that a NAF grant of $425,500 of FY 1967 funds would terminate the arrangement that had lasted for several years. The week before NRC had announced the availability of A Directory of Information Resources in the U.S. Federal Government, which contained about 1,600 Federal government and government-supported activities in science and technology, including the social sciences. In a memorandum to Hornig, Aines wrote: [1]

> It appears to be a useful document, but this will be better determined by its sales. In the long run, I would like to see the Clearinghouse for Federal Scientific and Technical Information undertake the referral service for the Executive Branch. This results from a view which is less slanted toward support of executive-managed agencies than the need to bolster up the Clearinghouse, which appears to be an orphan of the Department of Commerce these days.

In the same memorandum, Hornig was told:

> While on the subject of the Department of Commerce, a few comments are in order. I am trying to get together with Dr. Kincaid, Department of Commerce, to disucss the state of disarray in that agency, The disarray involves the lack of a focal point to coordinate the STI programs of the agency. The cost to Commerce as a consequence of its shortcomings has been substantial, eroding the respect of the other agencies. There are still groups in DOC unfamiliar with the actions of COSATI, that NBS under which the Clearinghouse operates has not disseminated its technical reports through the Clearinghouse, although Commerce puts the pressure on other Federal agencies to do so, that the budget of the Clearinghouse has been severely cut and morale is sagging there, and that there is no mechanism in the Department to coordinate the the variety of R&D and information-handling activities in that agency.

A considerable part of the problem was generated when Dr. Donald Schon, the Commerce representative to COSATI left the government. A problem also plagued the Patent Office, Department of Commerce. In the same memorandum to Hornig, he was informed:

> Earlier in the year, I sent a note to the Patent Office suggesting that stronger steps might be taken to improve the flow of patent information to groups outside the community of pattent attorneys, corporate patent offices, and technical publications. A check with Mr. Fleishman of the Patent Office revealed the following steps that the Patent Office had taken: Patent applicants must now prepare in 100 words or less a summary of the application in non-legal language that could be understood by the scientific and technical

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Subject: Activities Report, 30 September 1967, pp 5.

> community. Early in 1968, a weekly publication, the Patent Official Gazette, will be issued containing about 1,200 to 1,400 abstracts in lieu of the traditional dry-as-dust patent. The abstracts will be accompanied by a picture or drawing. A Speakers Bureau has been set up to bring information about the Patent Office and its literature to libraries, engineering schools, service organizations, and others. Fleishman states that the response has been "fantastic" with his speakers booked through January 1968. A greater effort is being made to get examiners in specific fields to prepare releases for scientific and trade publications. I am preparing a note to Mr. Brenner (Director of the Patent Office) informing his that we have heard that he some new programs to improve dissemination and would he be kind enough to send us a 2-3 page report on his plans and accomplishments. I know he will appreciate some attention from this office.

This small accomplishment of OST in getting the Patent Office to disseminate useful technical information from its dusty bins has probably never been publicized, but it does show that OST was examining many Federal programs in search for improvements.

Another issue arose in the National Bureau of Standards, dealing with funding for the National Standard Reference Data System, a program that had drawn the stout support of OST and COSATI. Dr. Edward L. Brady, Chief of the Office of Standard Reference Data, National Bureau of Standards was asked for a report of his fiscal problem. He obliged with a memorandum [1] that disclosed that the House had cut the program substantially. After describing the actions of the House Appropriations Subcommittee, he wrote:

> While awaiting final action on the NBS appropriation (from the Senate Appropriations Subcommittee), we have cut back severely on most of our projects. A few have been canceled. Some contracts for data centers have been renewed for a six months period rhather than a full year. All NBS divisions participating in the program have been worned. If additional funding from Congress or another source does not materialize, the effects would be catastrophic to the entire program, since further deep cuts would be required.

The information was passed to Dr. Hornig in a note which explained the problem and concluded with the remark: [2]

> It is ironic that the Soviets have copied the NSRDS program and have programmed a much large operation than we have been able to get supported. Ours is a good program and we have to keep it as solvent as possible.

All things turned out well for Brady that year. He called to inform us that the Senate had agreed to a $2 million increase for Commerce, one-third of which was to go to

[1] Brady, Edward L., National Bureau of Standards, Department of Commerce, Memorandum to Andrew A. Aines, Chairman (Acting) COSATI, Subject: Financial Status of the NBS Standard Reference Data Program, September 8, 1967, pp 1.

[2] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Subject: Information, 13 September 1967, pp 1.

the NSRDS. Brady attributed OST support for the congressional attitude, stating: "Of the entire Commerce budget only NSRDS seems to have been given a congressional blessing." The NSRDS program, one of the governmentwide STI programs established in the 1960s, has continued and grown over the years, providing scientists and engineers in the United States and the rest of the world with evaluated scientific and technical data, a contribution by the U.S. government of significant value. The fortunate position of COSATI was a boon to the Federal STI community during these years. Its termination was a blow to Federal science communications.

The ferment that was creating the growth of Federal STI programs was also stimulating actions in other countries. Canadian authorities discussed the possibility of a Canadian counterpart of COSATI. William Mills,State Department representative to COSATI, prepared a review of international organizations with his evaluation of their usefulness and growth potential in the science communications field. Peter Judge, the Executive Secretary, Information Policy Group, Organization for Economic Cooperation and Development, called for a working group on standards for data-processing and documentation. Professor Shigenori Hamada, President of the Japan Information Center of Science and Technology, was appointed by his government to develop a plan for an national information system in science and technology. After visiting the USSR, England, France, and several Eastern European governments to view their national STI programs, he reported considerable activity was underway in these countries, but the United States had out-distanced them. Dr. Erwin Lachman of the U.S. Agency for International Development stated that his agency was interested in international science communications and had taken earlier steps to establish a modest program. Aines suggested that AID consider the setting up in the United States of an institute to provide training in the STI arts and sciences for representatives of developing countries. Financial problems, according to Lachman, would prevent his agency from organizing and carrying

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Subject: Weekly Report, 6 October 1967, pp 5.

out a significant developmental program in this area. In reporting on the discussions with Lachman, Aines wrote to Hornig: [1]

> I propose that the President consider an announcement to the world at the Appropriate time that will cover a directive to set up an institute to aid developing countries in the STI area. For a couple of million dollars a year, he can demonstrate to the developing countries that we want to help them in obtaining the knowledge they need to lift their standard of living.

A meeting was held with J. James Irvine, Canadian Research Staff, Canadian Embassy, in Washington D.C. Irvine stated that a group had been formed in Canada to study STI matters. It was made up of representatives from government, industry, universities and other groups. The purpose of this all-Canada group was to study use patterns, present and future information requirements, modern information-handling techniques, international exchange mechanisms, and to formulate long-term policy for the evolution of a coordinated national information system. Interestingly, Irvine was unaware of the Canadian government's intention to creat a COSATI counterpart.

Representative Dante N. Fascell's House foreign affairs group prepared a report, Modern Communications and Foreign Policy, during the summer 1967, which was reported to the Director, OST. Samplings from this report follow: [2]

> The 20th century breakthroughs in communications ranks with the great forces which have shaped mankind's progress through history. Its impact on human behavior and world affairs already exceeds that of the atom bomb...It is astonishing indded that the U.S. - the country which adapted internally to the 20th Century breakthrough in communications...has not paid more attention to the impact of these developments on world affairs...
>
> At times, too much information - including mountains of trivia - is channeled to policy-making bodies. Given the antiquated state of most government information-handling systems, the making or right decisions has become increasingly difficult.
>
> The U.S. Government has achieved only limited progress in applying modern communications to the advancement of our international objectives...We have not learned to cope within our own government with the byproducts of the changing communications technology.
>
> Our official information services and related cultural and educational programs continue to be operated out of some two dozen separate agencies. Coordination is sporadic and not always effective. Most importantly, there is no one at the highest level of our Government who concenrs himself with these activities on a continuing basis...In the realm of attitudes which

[1] Aines,Andrew A., OST, Memroandum to Dr. Donald F. Hornig, Director, OST, Activities Report, 30 September 1967. pp 5.

[2] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Weekly Report, 6 October 1967, pp 4.

> govern our officials' outlook on modern communications...reorientation is particularly needed...The Executive Branch applies too little effort to the task of obtaining information necessary to improve the quality and effectiveness of our international communications.
>
> We urge the Executive Branch, particularly those agencies involved in the dissemination of information abroad, to confine their activities to undertakings which complement rather than compete with the private media. We recommend that an expanded effort be undertaken to assure a systematic, coordinated use of international communication tools available to our Government.

At the same time that Congressman Fascell was sounding the alarm, the Clearinghouse for Federal STI decided to discontinue publishing Technical Translations with the claim that this would eliminate duplication in announcement journals. In response to an OST query, CFSTI stated that it had coordinated this action with other Federal agencies. OST decided that it would only pursue the matter if there were complaints from the Federal agencies. None appeared.

In October 1967, at the Conference on World Education, held at Williamsburg, Virginia, President Johnson spoke eloquently of the use of modern technology and of what was already known about educational television to accelerate the pace and quality of basic education for the children of the world. T his announcement received considerable attention as a statesmanlike gesture. At the signing of the Public Broadcasting Act on November 7, 1967, the President called for the creation of a "network for knowledge. To obtain action, he appointed a Task Force on Networks for Knowledge under the chaimanship of Dr. Donald F. Hornig, his Science Advisor, to provide him with recommendations on how to implement the concept. On February 5, 1668, President Johnson extended his thinking with his espousal of the "fifth freedom" - freedom from ignorance, expressing the hope that all men whould have the opprtunity to develop their talents to their full potential, unhampered by arbitrary barriers of race, or birth, or income. On the same day, the DHEW introudced H.R. 15067 and S. 309, a Bill to Amend the Higher Education Act of 1965. It provided Title 10 (page 92): Networks for Knowledge Sharing of Educational and Related Resources Among Colleges and Universities.

(See the manuscript for other parts of the Networks for Knowledge story)

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Dr. Hornig convened the President's Task Force in March 1968 with the participation of the Chairman of COSATI to discuss the initial phase of planned development of the networks. Prominent in the discussion was the identification of a number of networks for knowledge in the Federal government and in the private sector - proposed, emerging, in early or full operation - in health, science and technology, education, libraries, mission accomplishment, and problem-solving. One of the tasks that Hornig assigned to Aines was to provide background and views on what was actually going on in the related fields of science, technology and education that would contribute to the solution of problems cited by the President. In mid-November 1967, Aines responded. [1] Here are excerpts from the cover memorandum:

> At the Conference of World Education, held at Williamsburg, Va., last month the President asked educators to use the fruits of new communications technology -- the computer, micromedia, educational TV, communications satellites -- to sow knowledge more effectively throughout the world...
>
> Perhaps the best way to begin is to ask the question -- is there a communications network for knowledge" The answer is -- there is no formal knowledge network, but there is a large de facto network. We are moving towards computer-based networks in science and education. Steps are being taken in and out of government to construct the rudiments of a worldwide system in science and technology.

To attain more rapid progress,

> We need the support and understanding of the President, Congress, Federal agency heads, educators, scientists, engineers, and others. We need new programs for the interchange of scientific and technical knowledge in machine language, calling for standards, agreements and common language. We need a new breed of scientists-communicators and educators-communicators who will work with communications engineers to bring the dreams of the President into reality... We need to encourage and support information sciences technology programs...New programs are needed to harness the power of the new technology and to train the present leaders in science-technology-education in the efficient employment of the new techniques so that they can communicate with the younger generation emerging from our universities already trained to handle the new media. We will have to learn how to form new networks for knowledge with their nodes and interconnections, with their administrators and support establishments, and with financial and manpower needs not yet blueprinted...Our experience in structuring national systems for scientific and technical information up to now has shown us that the best hope for sound and efficient programs results from the active participation of the generat-

[1] Aines, Andrew A., OST, The Growing Network for the Communication of Knowledge: An Inventory of Computer-Based Information Systems in the United States. This document contained a cover memorandum to Donald F. Hornig, Director, OST, Subject: A Response to the Challenge of Williamsburg, 3 pages, 15 November 1967. The Inventory part of the document contained 49 pages.

> ors and users of specific banks of knowledge, the only way to obtain useful and functioning systems. This calls for a decentralized approach to the establishment of information systems. On the other hand, to develop a homogeneous array of knwoedge systems that can and will intercommunicate, we need some kind of a central group to plan, coordinate, supervise, and provide financial support. No rationale for a centralized information processing establishment of a monolithic type has emerged and probably never will. Useful and relevant information and data are best kept at active nodes in the knowledge network, ready to flow on demand where needed.
>
> A word of caution. Insofar as the United States is concerned, we are probably blessed with the best scientific, technical and educational program in the world. (In our system) information flows fast enough to meet our major needs, with our oral-informal stream moving faster than the document flow. Applying sophisticated hardware and software merely to quicken the flow does not necessarily improve infromation service...Bringing knowledge more rapidly to foreign countries ill-prepared to accept and use information by means of sophisticated (unfamiliar) equipment can be dangerous and even counter-productive. Great care will be needed to develop phased programs, starting with demonstrations, research projects, and limited information service programs. The material provided on the following pages was selected to give a picture of the growing information systems in science, technology and other relevant fields...The Challenge of of Williamsburg provides new assurance and incentive to move forward more rapidly on a broader front in making he dream of a world network for knowledge a reality.

Following this statement of hope were a number of lists to show where progress was being achieved. The first list contained examples of machine-based systems in government science and technology. This was followed by a list of information systems in place or being developed by non-governmental organizations. Each of the examples provided detailed information about the name of the system or network, area of specialization, users being served, type of services being provided, size of the collection, degree of mechanization, relationships to other systems, and the future plans of each program or system cited. Then a list of other organizations involved in information systems for science, technology and education is provided in aggregate numbers. For example, at the time the paper was written, there were:

> 5,000 research centers, 7,500 special libraries and information centers, 1,600 scientific and technical societies, 2,300 colleges and universities, 368 abstracting and indexing services, 257 Federal STI facilities, and 111 Federally-supported information analysis centers (identified by COSATI Panel #6).

A list of ultimate users was compiled, which included:

> 500,000 scientists, 935,000 engineers, 1,000,000 technicians, 3,000,000 health workers (researchers, educators, practitioners, and students), 250,000 science and mathematics teachers in secondary schools, 6,500,000 college and university students, and 16,000,000 secondary school students.

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The paper also contained six exhibits:

> Specialized information and data centers supported by the Atomic Energy Administration, research centers of the National Aeronautics and Space Administration, top 100 users of the Defense Documentation Center's Technical Report Service, Federal STI facilities, ERIC Clearinghouses and Information Centers, and Federally supported information analysis centers identified by COSATI Panel #6 (about 320 are listed in the last of these located in the public and private sectors, but supported wholly or in part by the Federal government agencies.).

These lists are among the earliest compilations of computer-based information systems and may be of value to scholars seeking to trace the infusion of new information systems into the Federal government. The document prepared by Aines was unpublished and not widely disseminated. Currently, lists of this type may be available in various compilations, but there is no official list of government-supported STI and educational information centers that is issued periodically, at least up to the time this book was written.

The "Challenge of Williamsburg" - President Johnson's call for global networks of knowledge, a lofty aspiration - was forgotten as his administration came to an end. No other United States President has picked up the same torch since.

Late in 1966, Hornig sent the report of the COSATI National Information Systems for Science and Technology to the White House asking for some form of Presidential blessing -- issuance of the proposed statement and Executive Order, a paragraph in an appropriate message, or whatever actions that seem to be acceptable. This guidance was needed, particularly since funds for the program were to be included in the OST and the NSF budgets. Early in 1967, Hornig called for the White House's guidance because of the need to solve some practical problems -- copperation with the private sector, staff recruitment, defense of budgets, vigor of the efforts of the Federal agencies. [1] Based on the subsequent actions of OST, it would appear that the White House decided not to provide the Presidential "blessing" sought by Hornig.

[1] Hornig, Donald F., Special Assistant to the President for Science and Technology, Memorandum for Joseph A. Califano, Jr., Subject: Disposition of Package on STI, January 24, 1967, 1 page. (White House,

Nine months later, Califano sent a note with three recommendations relating to the improvement of libraries to Hornig for his views. [1] There was no information concerning the source of the three recommendations, which called for: (1) The Library of Congress, should be renamed: Library of Congress: The National Library of the United States and given a statuary mandate to play this role fully. (2)The Institute for Research Libraries and Information Science. The Institute would actively promote research and development relating to library and information transfer methodology. It would become a principal national center of information and library science and technology, modeled after one of the National Institutes of Health or National Laboratories of the Atomic Energy Commission. (3) A permanent National Commission on Libraries and Information Science. The basic task of the Commission would be to make an annual report to the President and to the Congress.

Hornig's response is summarized as follows: [2]

> The proposal (for Institute for Research Libraries and Information Science) makes several recommendations:
>
> --that the Federal Government should actively promote R&D in library science and information transfer;
> --that an integrated plan for supporting R&D by the various federal agencies now active in the field be developed;
> --that a National Center of Information and Library Science and Technology be established as a hub for the entire development.
>
> These problems were considered last year by the Task Force on STI and a copy of their report is attached. They noted that the Federal Government is presently spending in excess of $500 million per hear in the handling of STI. The principal agencies involved are Library of Congress, DOD, DHEW, USDA, AEC, NASA, DOC, and NSF.
>
> The most advanced computerized system is that of the American Chemcial Society carried out with federal funds. All of these agencies are incorporating computers in their systems. To varying degrees they support research, in-house and via grants and contracts. We also maintain several hundred specialized information centers, some supporting or carrying on research.

Hornig stated that the Task Force recognized the proliferation of information activities with the risk of both duplicating activities on one hand and generating expensive computerized but incompatible systems on the other. He added:

[1] Califano, Joseph A., Jr., Special Assistant to the President, Memorandum to Donald F. Hornig, Special Assistant to the President for Science & Technology, October 30, 1967, 1 page plus 3 recommendations.

[2] Hornig, Donald F., Special Assistant to the President for Science and Technology, to Joseph A. Califano, the White House, Subject: Proposal for Institute for Research

> (The Task Group) recommended we should move strongly toward developing a National Information System, based on the idea of a compatible network of systems which are rationally related o each other. To accomplish this, a central group (should) be established in OST to maintain technical and managerial discipline among the various systems and that responsibility be assigned to NSF to develop standards and carry on systems experiments and R&D aimed at all information systems.

Hornig then listed several actions already undertaken:

> Information activities are presently coordinated among the agencies and the Library of Congress by the Committee on Scientific and Technical Information (COSATI). It is doing a good job at coordination but aa been unable to effect any real integration of the various efforts, except in isolated areas.
>
> The President's Budget for FY 1968 carried funds for establishing a group of four professionals in OST to begin to integrate and coordinate all federal activities in STI. Now that Congress has approved, we are looking for people.
>
> The President's budget in FY '68 carried funds for NSF...This program was expected to carry out all of the functions proposed for the Institute and one of the questions has been precisely whether to start up a strong center for information sciences R&D.

Then Hornig concluded:

> The general proposal has great merit if the center is to provide an intellectual focus for a national information system. However, it could obviously not be in a position to implement anything as far as the other agencies of the government are concerned.
>
> A serious question is where such a center might be located. For a variety of reasons the Library of Congress seems impossible. In the first place, it is not part of the Executive Branch so it would make it almost impossible to give it a strong role in relation to over-all executive planning. Secondly, it does not appear to have the present or prospective technical capacity to lead the enterprise.

Finally, Hornig wrote to Califano:

> I recommend that we continue with last year's plan and that if a new impetus is desirable the center be set up in the National Science Foundation.

Of all of the initiatives considered, only the National Commission on Library and Information Science came into being, a rather modest effort in terms of resources and authority to effect change. The important point being stressed here is not that one program succeeded and others failed, but to highlight the interest and involvement of the White House in scientific and technical information, including libraries, almost two decades earlier. It was with this high level foundation of concern that OST, COSATI and the Federal agencies were able to make their contribution during that period.

Illustrative of the fervent dreams of the White House that were being transformed into realities were the remarks of President Lyndon B. Johnson at the signing of the Public Broadcasting Act. [1] After describing the authorization made by Congress in 1844 of $30,000 for the first telegraph line between Washington and Baltimore, the President reminded the audience of Samuel Morse's first message to a friend that was brief and prophetic: "What hath God wrought?" He followed this with this lyrical paean to the onrushing Information Age:

> Every one of us should feel that same awe and wonderment today. For today, miracles in communication are our daily routine. Every minute, billions of telegraph messages chatter around the world. Some are intercepted on ships. They interrupt law enforcement conferences and discussion of morality. Billions of signals rush over the ocean floor and fly above the clouds. Radio and television fill the air with sound. Satellites hurl messages thousands of miles in a matter of seconds.
>
> Today, our problem is not making miracles -- but managing miracles. We might ponder a different question: what hath man wrought -- and how will man use his inventions? The law that I will sign shortly offers one answer to that question. It announces to the world that our national wants more than material wealth; our nation wants more than a "chicken in every pot." We in America have an appetite for excellence, too...we want most of all to enrich man's spirit.

Recording his hopes about public television, he said:

> At its best, public television would help make our nation a replica of the old Greek marketplace, where public affairs took place in view of all the citizens. But in weak or even in irresponsible hands, it could generate controversy without understanding; it could mislead as well as teach; it could appeal to passions rather than to reason.

The President paid tribute to the late Dr. Milton Eisenhower, then at Johns Hopkins University, as the chairman of the first citizen's committee which sought allocation of air waves for educational purposes, and to Dr. James Killian of MIT and a former Science Advisor to the President, who served as chairman of the Carnegie Commission which proposed the Public Broadcasting Act. The Morrill Act, in 1862, set aside lands in every state -- land which belonged to the people --and it set them aside to build the Land Grant Colleges of the nation. In the same spirit, he said:

> So today we rededicate a part of the airwaves -- which belong to all the

[1] Johnson, Lyndon B., President of the United States, Remarks at the Signing of the Public Broadcasting Act, the White House, Washington, D.C., Release of the White House Press Secretary, Nobember 7, 1967, pp 6.

people -- and we dedicate them for the enlightenment of all the people.

The President then made several comments that will remain a memorial to his vision long after his involvement with the Viet Nam tragedy is forgotten. He said:

> I believe the time has come to stake another claim in the name of all the people, stake a claim based upon the combined resources of communications, I believe the time has come to enlist the computer and the satellite, as well as television and radio and to enlist t hem in the cause of education.
>
> If we are up to the obligations of the next century and if we are to be proud of the next century as we are of the past two centuries, we have got to quit talking so much about what has happened in the past two centuries and start talking about what is going to happen in the next century beginning with 1976.
>
> So I think we must consider new ways to build a great network for knowledge -- not just a broadcast system, but one that employs every means of sending and of storing information that the individual can use....I have already asked my advisers to explore the possibility of a network for knowledge -- and then draw up a suggested blueprint of it.

Graciously, the President credited a number of people for their contributions to the Public Broadcasting Act. Senator Warren Magnuson, who has been a staunch friend of the National Library of Medicine, who introduced the bill, and others in Congress: Senators Pastore, Cotton, Staggers, Congressmen MacDonald and Springer. He thanked John Gardner, the Director of DHEW for his support and leadership in the field of education, also Douglas Cater of the White House Staff for the "many months that he followed this legislation and worked on it."

The President made one other observation that information scientists should cherish:

> Eventually this Electronic Knowledge Bank could be as valuable as the Federal Reserve Bank.

Almost two decades have passed, and while the Public Television Corporation still is in business, the notion of the Network for Knowledge disappeared, although data bases and networks of all kinds have flourished.

One of the outstanding events of 1967 was the COSATI Forum of Federally Supported Information Analysis Centers, held at the National Bureau of Standards in Gaithersburg, Maryland, under the auspices of COSATI Panel 6 on Information Analysis Centers. Dr. Edward L. Brady, chairman of the Panel, acted as the host for the two-day meeting, the first (and perhaps the last) of its kind. More than 250 scientists, engineers, information managers and others were in attendance. A telegram message from the Vice-President, Hubert H. Humphrey, set the stage for the meeting. He called for information systems devoted to user satisfaction, better integration of Federal information centers and their services, and greater sensitivity to interdisciplinary clienteles and their needs. He stressed the need to advance to new frontiers of information service.

In his welcoming remarks, Dr. Brady asked the attendees to provide guidance to his Panel, whose mission it was to examine policies and operational problems connected with information analysis centers and to recommend possible solutions. To reach this goal, he announced that the audience would be divided into six workshops to examine specific problems in a number of areas.

The working definition of information analysis centers was set forth by Brady as follows:

> An information analysis center (IAC) is a formally structured organizational unit specifically (but not necessarily exclusively) established for the purpose of acquiring, selecting, storing, retrieving, evaluating, analyzing, and synthesizing a body of information in a clearly defined specialized field or pertaining to a specific mission with the intent of compiling, digesting, repackaging, or otherwide organizing and presenting pertinent information in a form most authoritative, timely and useful to a society of peers and management.[1]

The Panel had identified three types of IACs: the discipline-oriented center, the mission-oriented center, and what he called the census-bureau type, for the want of a better name, which collects raw or partially processed observational results concerning large scale phenomena.

[1] Brady, Edward L, COSATI Panel 6, Information Analysis Centers, Subject: Proceedings of the Forum of Federally Supported Information Analysis Centers, Committee on Scientific and Technical Information, Federal Council for Science and Technology, Novenber 7-8, 1967, Gaithersburg, Maryland, November 7-8, 1967, pp 65.

A potential list of IACs was prepared from some 400 candidates. About 111 seemed to the Panel to qualify as information analysis centers, with the accent on "analysis." The attendees were given copies of the list, which had been prepared by Dr. Herman Weisman, Office of Standard Reference Data, NBS. Brady posed a number of practical questions to be discussed in the workshops. Some of these were:

> What fraction of total funding for R&D should go into IACs?
> How should centers be coordinated with each other?
> What standards should be adopted for bibliographic processing?
> How does one decide when to start or terminate such a center?
> How does one measure the effectiveness and efficiency of an IAC?
> How much should users be expected to pay?

The keynote address was made by Congressman Charles A. Mosher (Ohio), a member of the House Science and Astronautics Committee. His subject was "The Congress, Too, Needs Information Analysis." A few highlights from his talk follow:

> We can assume that the Federal role and, therefore, the congressional role in science and technology will continue to increase rather than diminish because this nation is certainly confronted today and will always be confronted with crucial problems that require the mobilization of enormous complex technological energies. National science and engineering policy is now intimately and irretrievably interdependent with national, economic, social, military, foreign affairs, and domestic policy considerations...
>
> The prime question I am raising today is whether, and how, we congressmen can aequately comprehend and make use of science and technology in determining national policy -- how significant technical information and advice can effectively brought to bear on the legislative process. (Bear in mind that) few if any members in all of the Congress ...could make claim to science and engineering competence. ...In our policy-making role, in order to obtain a greater degree of parity with the executive branch, we need more effective effective tools: strengthened staff resources, better information, and adequate interpretation...We need technical management information, more than STI in the pure sense.

Mosher's speech was followed by a talk on "The Role and Importance of Information Analysis Centers," made by Dr.Donald F. Hornig, Special Assistant to the President for Science and Technology. Excerpts from his talk follow:

> When I was still an active research I was of the firm opinion that all that was needed was a mixture of common sense with infinite speed of reading and comprehension. I had very little use for formal information retrieval systems --they contributed more paper to the stacks of unread material around me. But still, I was uneasily aware of my inability to keep up with what was going on and of the multiplication of journals and scientific meetings. My common sense solution was to organize my graduate students and postdoctoral students

> so that collectively they would see that we didn't miss anything important. They also furnished me with critical evaluations of new work. I didn't know it, but I had formed an information analysis center.

Talking about his initiation to STI matters, Hornig said:

> When I joined the President's Science Advisory Committee in 1960 I learned that my problem was general, and shortly thereafter PSAC sponsored an important study on the goveernment responsibility for STI. That study resulted in the well known report, "Science, Government and Information," more commonly known as the Weinberg Report. Partly as a result of this report, partly because of the responsibilities of the Office of Science and Technology, and partly due to my own personal interests, I have been deeply involved in the problems associated with the proper use and distribution of STI ever since.

In Hornig's view, the problems of getting technical information effectively and efficiently to those who need it are among the most important facing us today. Our job, he said, is to make sure that STI is effectively employed in reaching (the many goals of society in education,national defense, health and commerce). Although some of the goals of the Weinberg Report have been carried out, there is still a long way to go, he contended. At this point, the members and observers to COSATI were pleased to hear him say:

> I am gratified by the progress during these past five years. Much of what has been accomplished we owe to the leadership and coordination of COSATI. I take this opportunity to congratulate the members of COSATI and the participants in its panels and working groups for the start that has been made... I look for great accomplishments in the future - and not just from COSATI - but from private organizations, professional societies and individuals, all of whom must work together if the future envisioned by the Weinberg Report is to be realized. Much remains to be done.

Shifting to a discussion about IACs, Hornig reviewed what the Weinberg Report had to say on the subject. It was his view that "the IAC is a vital ingredient in the viable STI system being developied in the United States." One of the major challenges to IACs (is) the need to get a much larger proportion of the technical community involved in their activities. Closely related is the need to determine the responsibilities of professional societies, private industry, and government in the entire STI system, also how to develop the coordination and communications among them. Because the problem of standards and compatibility is growing, he announced the assignment of Dr. Chalmers Sherwin to explore the problem for the OST; the total system had to be operated more efficiently since there were not enough resources for everything, he pointed out. The improvement of STI processes, per se, was not enough. The goal is to aid the pro-

gress of science and technology and their application to solving our blems.

The next speaker was Andrew A. Aines, then Acting Chairman,COSATI. The subject of this talk was "COSATI Activities and the Future of National Information Programs."

A few of his remarks are summarized:

> There was a period in my development of perception about the needs of our information during which I convinced myself that what we really needed to attain progress was a number of fully accredited high priests, whose dicta and pronouncements on the subject would be akin to Olympian sanctions. They would form schools which somehow would produce programs and leaders -- and hopefully followers. And some how out of this would come progress in the form of richer information and more sensitive communications.
>
> When the public became aware of the disturbing views of Marshall McLuhan and his mentor, Harold Adams Innis, I was convinced that this indeed was the magic formula. After all, who could argue, when like thunder out of the east,you hear prtentious observations like: "The content of communications determines the direction and pace of dynamic social development." "Collective actions are only possible if a common fund of knowledge and information is shared." "The process of modernization depends on people receiving new messages, new pictures and images of what life can be, and learning new responses to new stimuli."No, this not McLuhan speaking; it is Lucian W. Pye, who authored these statements. While I have not abandoned completely my prayer for the appearance of high priests, nor my belief that they will play a vital role in the world of the New Communications, I do not equate the growth of communications affluence and efficiency to their coming. Our sea of problems will not part as a consequence of their presence, I suspect. Historians and prophets have their place in our society, but the real mover of our era is technology, whose great, "sledge hammer" blows are shattering in their effect on the way we live and communicate.

Aines' next statement had to do with the planning and system building. He said,

> I despair that we can by virtue of undernourished planning or even well supported planning develop a model information system with the flexibility to withstand the high winds of technologically-induced change. If communication is the web of society and society is undergoing and will undergo continuing waves of unsettling change, the last thing we would want to do at this time is to opt for the Grand Design, the Great Brain, the Finite Information system. But do not misunderstand me, I am not abandoning my view that we need to plan. We have to do it at all levels: daily, monthly, and yearly by all groups which are part of the information-processing community. It has to be done ad hoc, reflective of changing needs, changing communications technology, and changing resources. It has to have a highly sensitive feedback capability. It calls for the highly efficient interchange of information among those who are busily seeking to structure exchange systems and programs.

On information analysis centers, he stated:

> The attachment we all share for the growing influence of the IAC is, I believe a reflection of our conviction that the marriage of the scientist and informationist will be blessed with superior progeny. I recog-

> nize fully that there are many areas in the STI meadows where the intellectuality brought to bear in the IAC would be out of place. We need cultivation there assuredly, but to me, at least, we must be prepared to grow and nurture orchids and camellias (the fruits of the true IAC) as well as the hollyhocks and nasturium (of the less exotic IACs) in our information garden...The information analysic center, properly functioning, should be closer to the scientists and engineer than, let us say, document-processing centers or other activities where their presence as participants are less needed or in evidence. Because of this special relationship or perhaps we should call it fortuitous association, the managers and workers in the Centers must play a larger role - an educative role - for the entire STI community when this is appropriate. This means that those of you involved in the development and operations of information analysis centers must follow the dictum that you prosper as you retain active membership in the communications community and know what is going on, and I mean in detail.

At the time of the conference, there was considerable action in Congress to legislate on freedom of information and to revise the copyright law of 1909. To bring the attendees up-to-date on what was happening on these two actions, Anthony L. Mondello, Office of the Legal Counsel, Department of Justice, discussed the Freedom of Information Act, and Abraham L. Kaminstein, Register of Copyrights, Library of Congress, talked about the impact of the revised copyright law; both of these speakers had a long association with COSATI and were quite familiar with its objectives and programs. They were followed by a roundtable discussion on Freedom of Information, Copyright and Security Requirements, headed by Charles F. Knesel, Atomic Energy Commission, Melvin S. Day, NASA, and George MacClain, Depertment of Defense. Six working groups met and filed reports: Edgar A. Bering (National Institutes of Health) on Administrative Problems; Y.S. Touloukian (Purdue University) and David Garvin (National Bureau of Standards) on data and information problems; John W. Murdock (Battelle Memorial Institute) on personell problems; Albert J. Belfour (Belfour Stulen, Inc.) on customer interactions; Chalmers W. Sherwin (OST) on information systems of the future; and Curtis L. Fritz Department of State) on documentation systems of the future. A wrap-up session was chaired by Brady to record the views of the panels, which were, on the whole, optimistic and upbeat concerning the future of IACs.

Looking back to this Forum and its predictions for the future brings mingled emotions. They continue to exist, but they did not proliferate and grow with the expansion of science and technology over the years. The leaders of Federal R&D programs have not shown the enthusiasm of Dr. Donald F. Hornig or the PSAC (Weinberg) Panel about their

function and support in recent years. This is also true of the leaders of the non-government professional societies, not excluding the National Academies of Sciences and Engineering. The managers of IACs have had to learn marketing techniques to survive the erosion of Federal funds. This is not a "bad" development, per se, but the added effort that this takes has tended to reduce the amount of time devoted to providing superior service to users on the part of the IAC leaders. Growing competition in global science and technology results in a reduction of willingness to interchange STI and data, especially in the applied research and technology fields. This, in turn, inhibits the development and support of centers whose function is largely dissemination and interchange. Careful thought needs to be given to the future of IACs in the next few decades, but this does not appear to be in the offing. On the other hand, there has to be some optimism expressed. The "notion" of effective IACs as a tool to contribute to productivity of science and technology even in a "closed" or "semi-closed" environment remains solvent. Continued government support, even on a more limited basis, indicates that the function is still regarded in R&D circles as meritorious.

International problems and issues were constantly being reviewed by the OST-COSATI information staff. One problem that received attention was the result of what British Prime Minister Wilson called "a U.S. takeover of Europe's industry. [1] Said Wilson, "The problem is too urgent to be delayed...There is no future for Europe, or for Britain, if we allow American business and American industry so to dominate the strategic growth industries of our individual countries...All of us in Europe are operating on too small a scale and unless we get on to a European scale, we face the danger of continuing penetration and takeover." Aines wrote to Hornig: [2]

> The U.K. because of its previous relationship with the United States enjoys a special position vis-a-vis intimate knowledge of our science and technology programs in defense, nuclear energy, and others. That Britain

[1] News Dispatches datelined London, November 13, 1967, Wilson Hits U.S. Takeover: Gives Europe Plan, Washington Post, November 14, 1967, page A3.

[2] Aines, Andrew A., OST, Memorandum to Donald F. Hornig, Director, OST, Subject: Wilson's Outburst, November 15, 1967, pp 1. (clipping above enclosed)

> has been unable to hold on to a lot of privileged information and data is a sad fact of life. There are strong feelings in DOD about security breakdowns and the need to take a "hawkish" attitude about the free flow STI. I have been an opponent of this shortsighted view. However, if Wilson and Co. seek to go on the offensive against the U.S. and its interests, it may be necessary to make an agonizing re-appraisal. No immediaction is (contemplated), unless the clouds continue to gather.

At the time, England had not become a member of the Common Market, but was involved with France in the construction of the Concorde airliner. Wilson suggested the formation of a European institute of technology and Britain's willingness to change its laws on patents, monopolies, restrictive practices and company law to suit "wider economic cooperation" with Europe. COSATI members were quick to point out that England, Canada, Australia and New Zealand, because of defense pacts, were privileged in receiving STI generated in Federal agency programs. STI outflow from the United States far exceeded what the U.S. was receiving from them. Fortunately, cooler heads prevailed and no effort was made to reduce the flow of STI to Europe.

The international exchange of nuclear data came into question during this period. At an OST meeting [1] attended by Edward Brunenkant (AEC), William Mills (State Department) and Chalmers W. Sherwin, OST consultant, and Aines.Brunenkant, Director of the AEC STI program, explained that his agency was switching from the bilateral-regional approach to one whereby AEC would use all ongoing nuclear energy information centers to increase the flow from the Soviet bloc. Thus AEC would reduce the number of overseas depositories to one per country from which it will distribute its microfiche reports. AEC's output at that time was about 7,000 titles a year, half of which were received from Europe, half/ of these originated in the Soviet Union. At the meeting, Brunenkant discussed the pros and cons of using ENEA, Euratom, and other international organizations. He also agreed to pause in the development of standards and codes for the international interchange of machine-readable records, if Dr. Sherwin would expedite the work of his new standards panel that Dr. Hornig announced at the IAC forum at Gaithersburg, Maryland.

[1] Aines, Andrew A., OST, Memorandum to Dr. D.F. Hornig, Director of OST, Subject; Activities for the Week, November 11, 1967, pp 4.

And yet another entry in the Weekly Activities Report (November 11, 1967) dealt with the Soviet Union, Aines wrote to Hornig:

> The importance the Soviet Union places in STI organization and programs is seen in the recently prepared, "Science Policy and Organization of Research in the U.S.S.R.", No. 7, UNESCO series Science Policy Studies and Documents. The article discusses the history of Soviet initiatives through 1963 in the development of a national information system. The initiatives listed are considerable and offer those in the United States who advocate a gradualistic approach (to a national information system) little comfort. Historians of science will be interested in the (Soviet) claim that M.V. Lomonosov first advocated the idea of an abstract journal in 1763. The COSATI Task Group on National Systems and the Panel on International Information Activities are being asked to review the document in light of our own current program.

One of the most unhappy marriages in the Federal STI community was that of the National Science Foundation and the Smithsonian Science Information Exchange. SSIE did not appreciate what it considered interference with its independence by NSF. NSF was weary of providing funds for a program that presented a "porcupine's defense to what it considered to be its enemy." SSIE felt it was not getting enough funds for its operation and was uncomfortable with the requirement to generate funds through the sales of its information products. NSF was convinced that SSIE was poorly managed and it resented SSIE's lack of forbearance in "running to Congress with its complaints." SSIE was angry with NSF for not finding ways to increase the input from the individual Federal agencies.

It was not a surprise when Dr. Hornig, Director, OST, received a letter from Leland J. Haworth, Director, NSF, expressing his unhappiness with SSIE. [1] Haworth wrote:

> At its 15th meeting on June 15, 1967, the Science Information Exchange Advisory Board recommended that NSF (OSIS) initiate action to refer the matter of SIE funding and/or stewardship to the Federal Council for Science and Technology for consideration. Also that NSF (OSIS) seek adequate funding for SIE's efficient operation, but sufficient to permit reasonable development of SIE's growth potential. The Advisory Board believes that SIE's fate cannot be tied to NSF (OSIS') budgetary level, already established as inadequate.

Haworth then wrote that he strongly seconded the recommendation that FCST place the

[1] Haworth, Leland J, Director, NSF, to Donald F. Hornig, Director, OST, Letter dated October 23, 1967, on the sujbect of the Smithsonian Science Information Exchange, pp2.

question of the SIE on its agenda for early consideration, but he believed that the FCST's consideration should extend beyond what SIE Advisory Board formulated. He reminded Hornig that NSF assumed the management of SSIE in FY 1964 by virtue of FCST agreements reached at the May 28, 1963 FCST meeting. NSF, he went on, then contracted with Smithsonian to manage SSIE's operations. Part of the deal was to fund the reconstitution of SIE's governing board with the present advisory board. Additionally, SSIE's charter was revised to give priority service to the Federal agencies with emphasis on management information. During the four years that elapsed, circumstances and requirements changed, he wrote One example being the increasing government-wide concern with the rational and effective management of resources devoted to scientific research which has placed a premium on management information. Said Hornig:

> These developments fully warrant a review of the role of the SIE as well as its administrative location. I hope you will agree to an early consideration of this matter by the Federal Council...

The Haworth letter was first referred to Dr. Sherwin and a week or two later to Aines for his consideration. The latter prepared a response for Haworth and sent it with a cover letter to Hornig. [1] The cover letter indicated that the subject had been discussed with Dr. Charles Kidd, Executive Secretary, FCST, and Dr. Burton Adkinson, OSIS-NSF. It was suggested that Hornig discuss the matter with Dr. Haworth by telephone, rather than send the letter. In his proposed letter for Hornig's signature, Aines wrote:

> Quite aside from its relationship to NSF and Smithsonian Institution which, along with perennial problems of financing, are major difficulties, I remain convinced that our most immediate need is to re-evaluate the role of the Science Information Exchange in light of recent developments and changing needs. There are at least four needs and developments indicative of changes requiring fresh appraisal.

These were listed as: (1) FCST's agreement to move towards a common project-reporting format to facilitate better interchange of data among the agencies; (2) The requirement for all of the larger Federal R&D agencies to develop a sound, ADP-based management reporting system for their R&D programs and projects; (3) To determine the

[1] Aines, Andrew A., Memorandum to Doanld F. Hornig, Director OST, Subject: Response to Lee Haworth, Director, NSF, 1 November 14, 1967, one page. (The suggested response consisted of three pages.)

the role of SIE in the future as a result of the improvement of agency project reporting capabilities. (4) Increased concern about the R&D management information and data requirements of NSF, BOB, OST, FCST, Congress and other groups in and out of the government.

Dr. Hornig chose to call the NSF Director, Leland J. Haworth, and out of their discussion came an agreement that a study would be undertaken by OST with the financial assistance of NSF prior to bringing the matter up to the members of FCST. This also meant that the differences between NSF and SSIE would continue, much to the discomforture of both. Unfortunately, some of the issues went beyond the two parties to work out. SSIE was not doing the kind of job to satisfy the members of FCST, most of whom cooperated rather reluctantly in making their current R&D project data available to SSIE., or, if they did, they were not in a great hurry to do so. Moreover, their R&D managers and bench workers had employed informal methods of getting the information from the other agencies, hence they did not feel that there was much to gain through the use of SSIE. The management of SSIE strove mightily to obtain the information from the agencies, even employing the help of groups in Congress to do so. This, too, did not sit too well with the agency R&D leaders. One of the most difficult problems, as seen through the eyes of the OST STI staff, was the failure of SSIE to work closely with the agencies, except those involved in health R&D, where SSIE's status was higher. SSIE's marketing ability was unequal to the requirement. In addition, SSIE was unable to deliver on the provision of management information, as pointed out by Haworth in his letter to Hornig. The leaders of SSIE were oriented more to the operation of a computer-based information system than to the management of Federal research and development programs. This might have been solved by changing the leadership at SSIE by bringing in a highly competent R&D manager, but this did not happen. This should have been a high priority requirement for the Smithsonian leadership, but it was not perceived that way, unfortunately. This failure may have been the basic reason why SSIE ultimately disappeared without a protest of the Federal community.

The decision having been made by Hornig and Haworth, the next task was to prepare a proposed task statement, which Aines decided to do himself. [1] The intent of the task was as follows:

> As a result of several developments in communications technology, R&D management, and information systems improvements, it is becoming possible for Federal agencies to organize more efficient internal and joint programs for the exchange of R&D on-going project information. As a consequence, it is desirable to evaluate what progress has been made to date, and to determine what role the Science Information Exchange will play in the future. It is suggested that the best mechanism to obtain the needed information and to provide OST and FCST with recommendations for action is a competent contractor.

A set of working principles to assist the contractor included are listed:

> The purpose is to raise the level of science and technology by establishing a project-reporting system that would be an improved tool for managers, scientists, engineers, planners and budgeters involved in government R&D management. To be effective, the system must be used, hence it must have the support of the community for which it is intended. Thus, it must be useful at all levels - from the bench at the laboratory to top directors of R&D at OST, examiners at the BOB level, and horizontally by researchers throughout the government. The system should operate with a minimum of supervision and there must be a feedback system to assure corrective action, where needed. While Federal agencies will employ project-reporting systems that will provide them with requisite data to serve their missions, they will be expected to base their systems on the common project-reporting form.

A longer list of the elements of the task was detailed for the bidders and this was followed by a section on the administration of the contract. NSF would be responsible for the administration, while OST would retain responsibility for the technical supervision.

While this was going on, Chalmers Sherwin had the first meeting of his task group. Hornig attended and provided a review of the purposes of the Sherwin task force. John Tukey of Princeton made a number of useful and pertinent observations, as did Herbert Grosch, National Bureau of Standards. The latter called for a more refined statement of purpose of the task, as did others at the meeting. Sherwin issued a paper, in which he outlined a course of action for discussion purposes. After the meeting, Sherwin expressed unhappiness about the course of the meeting, but felt more

[1] Aines, Andrew A., OST, Memorandum to Dr. D.F. Hornig, Director, OST, Subject: Proposed Task Statement (Study on Federal R&D Task Reporting), November 24, 1967, pp 4.

assured that he could ultimately get consensus on a standard after discussions with Edward Brunenkant, AEC, who was willing to await the product of the Sherwin task group before plunging ahead on the international energy information scene.

As COSATI sought to exercise its leadership in the Executive Branch, it was becoming more obvious with each passing day that there were a number of agencies, which,while not involved in R&D,nevertheless did have a relationship and an interest in what it was doing. One of these was the U.S. Information Agency, which maintains libraries in many countries of the world, libraries that are designed to inform users about what is happening in the United States. A considerable part of the holdings of these overseas libraries deals with scientific and technological subjects. At the invitation of the Director of USIA, Aines made a presentation to the various heads of the agency on the OST-COSATI goals for science communications. [1] An exploration was made of the possibility of USIA sending key people to COSATI meetings, even though USIA was not in the R&D business basically. Aines stated that they would be welcome primarily as workers rather than auditors. A week later, the Assistant Director of USAI sent a letter with a few interesting remarks. [2] Harris said:

> Informal conversations immediately after the meeting revealed a marked interest to close participation in COSATI among those present, who represented all of our media as well as administration, research, security and the legal staff. This letter becomes a basic part of the record in the expansion of USIS's embryonic role to a much broader presence in COSATI.

Dr. Hornig was sufficiently impressed with USIA's eagerness to become involved with OST and COSATI to further the dissemination of U.S.-generated STI that he sent a special note expressing his approval. In effect, this was interpreted to mean that he expected COSATI to contribute, not only to the efforts of the Federal R&D agencies, but to all Federal agencies that were involved, even tangentially, with Federal programs. His pro-active approach towards the wise employment of information processes and programs was inspirational to his OST information staff and to the members of COSATI.It persisted throughout his tenure in the Executive Office of the President.

[1] Aines, Andrew A.,(OST), Memorandum to Donald F. Hornig, Report of Meeting with USIA Officials, November 28, 1967, pp 2.

[2] Harris, Reed, Assistant Director, USIA, Letter of Aprpreciation from Harris to Aines, November 21, 1967, pp 2.

2.3.4

Another White House aide who was anxious to extend action on the Network for Knowledge concept was Devier Pierson, one of President Johnson's senior assistants. He asked Dean Croston,a DHEW official who was one of Dr. Hornig's panel members, to prepare a short paper to the President on the subject. [1] A few excerpts of Coston's paper follow:

> Concern for the more effective use of worldwide communications for the public good has been rising; the opportunities to improve and widely disseminate knowledge and learning throughout the world have never been greater...We have the potential for bringing the great teachers to students throughout the world; for making the contents of our libraries freely available to all nations and institutions; for collecting, processing and retrieving in an orderly way the vast accumulation of data which threatens to overwhelm us; to bring the knowledge and skills of the great medical centers to practitioners in the remotest places; and to provide services yet undiscovered to the people of the world. To assure access to a worldwide system for activities principally related to the public benefit, at reasonable cost and with adequate protection for the private requirement, will require a most thoughtful consideration of public policy issues, of technologic questions, and of costs.

Parenthetically, when the above was read by the OST staff, we chuckled that we had not yet succeeded in establishing such a program in the Federal government, and certainly not as a national enterprise, and now we were being invited to "internationalize" the effort. The vision of the President was highly appreciated,it should be pointed out, but recognition of all of the problems entailed, the obstacles piled on obstacles, the amount of intellectual and other resources that would be needed - these were beginning to be understood based on the difficulties encountered by the Task Group on National Systems in a much more limited arena. Returning to Coston's draft, he then gave a number of examples familiar to the STI community:

> The Federal Government is currently supporting "knowledge banks" in a great variety of areas-- and investing over $500 million a year in information processing centers such as the National Library of Medicine, the Atomic Energy Commission Centers, Department of Defense programs, the Science Information Exchange of the National Science Foundation and hundreds more. The U.S. Office of Education is supporting programs for the acquisition of educational media systems by State and local schools at a cost last year of $800 million. A demonstration program is teaching remedical reading to children in Alabama by a two-way link to a teaching machine in California. An electrocardiogram,

[1] Coston, Dean, Department of Health, Education and Welfare, Memorandum to Donald Hornig, Subject: Preliminary Paper on Network for Knowledge, November 27, 1967, 1 page, with a draft description of the network, 3 page.

originating in France, was interpreted over a two-way link to the United States by French and American physicians. In short, components of a "network for knowledge" exost around the world. Large segments of this network are based on extensive, but highly specialized information banks. The network, however, has not yet appeared. Formulation of goals, projection of need, planning for operations are specialty based, with inadequate consideration of compatability.

Coston then proposed three approaches in developing a network for knowledge:

1. Information storage, retrieval and analysis centers should be inventoried and classified. More free exchange between the centers would be established through use of common languages and system compatability. Coding systems to protect classified information should be developed, and further study of copyright or proprietary ownership protection is needed.

2. Operational networks in the medical science should be established. Building on the planning for regional medical programs, the comprehensive health planning program, the National Library of Medicine, and the associated capabilities of the Food and Drug Administration and other health agencies, such an operational network would begin by linking major medical centers to provide ready access to the National Library of Medicine, the FDA drug information system, and the subsystem now being established by the regional medical programs. Through the Public Health Service and the World Health Organization, pilot and demonstration projects should be established to link centers of medical excellence to counterpart centers abroad, with first priority to a South and Central America project using the satellite.

3. A network for education should be planned, building first on the ERIC educational research centers now being developed; then bringing together University systems, and evenuallly linking State Education Departments and through there, the local elementary and secondary systems. Such a system could be established through interconnection of the existing educational broadcasting stations and adding multiplexing facilities to transmit materials other than broadcasting programs.

Consideration must be given to eventual integration of the three systems; equipment and program compatability thus becomes critical.

Coston called on OST to establish a group to develop the specifications for the network, with authority to draw on the agencies. It should also assume primary responsibility for the task of developing information storage, retrieval and analysis networks. Within the Public Health Service, NLM should have primary responsibility for the operational medical network, while the Office of Education should bear similar responsibility for developing the network for education. To prepare the pilot international programs, the State Department, USIA, and Public Health Service need to work together, Coston recommended. Finally, he stated that planning for the system could be done within existing authority, but to create operational networks, specific legislative authority should be sought. Needed studies could be undertaken by the

employment of contractors, using Office of Education and Public Health Service contracting authority and funds.

When the Coston proposal was read and digested by the OST staff, Aines wrote to Hornig, [1]

> As you know, I agree wholeheartedly that we ought to pick up the task in OST and strt to move, but I hope that the tasks suggested for PHS and the Office of Education, as well as the others, willl be part and parcel of the OST program. To get the job started, here is a proposal:
>
> 1. Ask the COSATI Task Group on National Systems, working for OST, to undertake the task of preparing a preliinary appraisal and undertake such studies as we need to provide background knowledge.
>
> 2. Set up a small group under Dr.Ruth Davis, NLM, to spearhead the effort, bringing in the best people we can get from the Sgencies to assist. These would include persons from science, engineering, education, computer and network specialists and consultants. Dr. Davis would be backed by her own staff at NLM. Dr. Cummings, NLM Director, has agreed to make her available. Cummings has also agreed to put up $50,000,and has exacted an agreement from Dr. Adkinson of NSF to match his $50,000 or provide more. We think that we can get about $250,000 or so to support the studies that we will probably want to consider.
>
> If you agree and can get support from Cater (White House aide) and others, I will start the ball rolling and while others are still thinking about the proposal, you will be able to make an announcement about the steps your are taking to get action. Our Task Group on National Systems is enthusiastic about this new program and has asked be to pass this on to you...

Not only did Hornig have the Coston and Aines suggestions, he also received another one from his staff a few days earlier. [2] In this note to Hornig, which preceded the comments on the Coston proposal by a few days, Aines pointed out that inquiries were being received from newmedia, private computer and communications groups and government officials - all seeking information about the implementation of the networks for knowledge declaration of the President. Aines asked the question: how much time ought we to expend on this program? He also suggested several other actions independent of what was already going on in OST-COSATI information circles. He wrote:

> We could convene a group from universities, industry, communications, information-processing, Congress and other groups. We could start a dialogue on social engineering and resource application aspects. We could ask for input from OST and FCST members. We could form an ad hoc working group to consider a logical boundry for the effort lest everybody go in all direc-

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Proposal on Network for Knowledge, 29 November 1967, one page.

[2] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Activities and Views. 25 November 1967. pp 5.

> tions dissipating their energies uselessly. We could form a new and somewhat invisible COSATI work group made up of a few government people and a couple of consultants to study the problem in relation to our National Systems and International Information Activities panels, asking them to look at the President's concept from the point of view of information experts and communications engineers who are asked to not to criticize but to prepare the blueprint needed.

With the possibility that OST would be directed to become involved in the network for knowledge program, the need for an enlarged OST information staff became even more imperative. This was discussed with Dr. Lee Westrate of the Bureau of the Budget staff, who had begun to interact more vigorously with OST and COSATI, together with other matters. [1] Most of the following was provided by Aines during the discussion:

> The interest of the President in a world network for knowledge would possibly result in additional resource requirements BOB might begin to consider. Federal R&D agencies need stronger internal information coordination programs. Some lack focal points for STI, a lack reflected in internal coordination problems and their ability to interact with COSATI efficiently. A new look at agency STI budget data was needed. Dr. Hornig had asked for four information professionals for his office. NSF ought to follow the OST lead since it was going to provide additional support to OST. About 12 information experts should be sought by NSF. The agreement that OST would implement the recommendations of the National Systems Task Group made the four-persons addition to OST staff a key to implementation of the National Systems plan. The best hope in solving the NSF-SSIE problem would be the major project-reporting study that we were considering. The pay off would be the availability of better management information that would be helpful to BOB, OST, Congress, etc. BOB should undertake to inform the Federal agencies that each of them should have a full time STI coordinator and manager on their staffs. Finally, BOB should have a full-time focal point to assist in the development and coordination of information programs.

Aines also informed Dr. Hornig that Lee Westrate would prepare a paper on the subject for the BOB Director, Charles Schultze, that Hugh Loweth (BOB) and Westrate are working together on the subject, and that Loweth was becoming convinced that BOB needed to raise its level of competency to deal with some of these information matters. Few of BOB's budget examiners were familiar with information matters, thus competent to deal with them.

Another dialogue took place with BOB a few weeks later. [2] In attendance from BOB were Hugh Loweth, Joseph English, Lee Westrate and Glen Sleede. The purpose was to discuss

[1] Aines, Andrew A., OST, Memorandum to Files, Subject: Discussion between Lee Westrate, BOB, and A.A. Aines, OST, 22 November 1967, pp 2. This document was sent to Hornig as an enclosure to his memorandum of 25 November 1967 to Dr. Hornig.

[2] Aines, Andrew A., OST, Memorandum to Donald F. Hornig, OST Director, Weekly Report and Other Information, 31 December 1967, pp 3

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some of the growing problems of identifying, understanding, and organizing to obtain a better grasp on the STI area. Jack Young, BOB Deputy, who had been briefed earlier by Aines, wanted to know the specific actions that could be undertaken to improve both coordination between OST and BOB and the overall STI program as well. The OST representative made the following points:

> The most critical requirement, from a Federal standpoint, is to seek improvement of the agency programs to provide a firm foundation for the overall Federal STI program. In turn, this would contribute to a stronger national and international posture. Agency programs suffer from a lack of front office concern, knowledge of the size of their own programs, lack of internal coordination, and weakness or absence of agency STI focal points.
>
> Not all BOB examiners are familiar with agency STI programs or the lack thereof. Most are unfamiliar with OST-FCST programs to coordinate STI programs. Within BOB, there is no focal point to coordinate all of its own information programs.
>
> A better effort is needed in the management of science communications across the board, including budgets, line items, espenditures - all of the elements that are subsumed under planning, programming and budgeting.
>
> More serious thought is needed about national, international programs, including initial studies in the "networks for knowledge" area.
>
> Reasonable action is needed in standards, technology utilization, project and proposed project information sharing, policies on service fees, exploring information interchange and coordination with Congress, looking ahead in education and training needs, and overall (intersectoral) information sciences and technology coordination.

Another obvious weakness of the Executive Office was its failure to appraise the impact of new communications technology. The communications apparatus now being formed calls for inevitable changes in organization, including the way we exchange knowledge in the Federal government. If this view was excepted, this was the time to accelerate EOP action. Although limited by staff and other resources, this philosophy what was energizing the OST information staff and contributing to our COSATI stewardship. BOB could help, it was pointed out, through its understanding and support (as well as strengthening its own efforts to cope).

In recording this tidbit of history almost two decades later, it is striking to note that while OMB has sought to strengthen its information oversight program in recent years, it has retrogressed in the STI area, although this criticism should include the Office of Science and Technology Policy. Agency STI programs have been weakened rather than strengthened. Coordination is almost non-existent. Interaction between Congress

and the Executive Branch insofar as organized information exchange programs are concerned is more marked by hostility and suspicion than cooperative ventures. Focus on development of Federal, national and international programs is either dispersed or non-existent in the Executive Office of the President. Instead of the BOB examiners accepting the advice of Aines to strengthen their internal information program and support the OST and COSATI STI programs, they appeared to go in the opposite direction and expand their criticism of the OST information efforts. This attitude was expressed in muted then more strident observations with the passage of time. The change became more manifest with the end of the Johnson Administration and the ultimate departure of Donald F. Hornig, the Director of OST, and subsequently, a few top members of the BOB staff.

Meetings were held with the Executive Secretary of the National Advisory Commission on Libraries, Mel Ruggles, who stated that the report of the Commission would be ready in the near future. Ruggles was quite candid in reciting the diificulties of the Commission and himself in getting the job done. He stated that the studies undertaken by the Commission were uneven in quality. The leadership of the Commission chairman was less than expected. This included a lack of attendance and involvement. Ruggles stated that the deliberations of the Commission were severely influenced by the vested interest groups on the Commission. He was asked to make sure that the terms of reference that appeared in the charter of the Commission received adequate attention in the final report and where answers to the questions and issues were not provided in the final report, a reason should be given for their absence. Ruggles stated that he now had litte influence on the decisions of NACOL and could not guarantee any changes. He offered to "loan" Aines a copy of the draft report, but Aines refused, stating that he wanted nothing to influence his appraisal when it was formally received. When the final report was submitted, it was received by BOB rather than OST. Westrate, OMB, stated that he was disappointed with the report, Library Services for the Nation's Needs: Toward Fulfillment of a National Policy, because it did not lay out an inventory of things to be done to improve the library situation, but it was the library community asking for

more authority and support.[1] In this memorandum, Aines stated his intention to give all of the COSATI members an opportunity to provide their views about the report. While Ruggles and Westrate were critical of the report in total or in part, but for different reasons, it did appear to Aines that the problem of Federal libraries per se or as part of the larger information community needed top level attention and assaulting the NACOL report would not be a desirable solution in absence of a program to review the status, problems and future contributions of libraries.

As 1967 drew to a close, two budget issues involving the National Library of Medicine emreged. The FY 1968 Cost Reduction Pogram and the Bureau of Budget FY 1969 allowances would severely restrict efforts for the National Library of Medicine to plan, develop and operate a modern health information network. At issue was $1,350,000 and 20 spaces in the NLM FY1969 budget, which BOB intended to delete. Aines wrote to Hornig about the need to defend the NLM program: [2]

> The two programs affected represent a major national effort in health education and communications innovation related to declared Presidential objectives. Their fate to date in the FY 1969 budget process has been such as to retard further progress toward these ob jectives, which are: the application of modern communications technology toward the development of a "knowledge bank" for educational purposes; the application of new knowledge gained in national biomedical research programs to the people's health (Presidential statements on the signing of the Heart Disease, Cancer, and Stroke amendments, and onr eceipt of the report of the President's Commission on Health Manpower; and national science infomration systems, as proposed by COSATI and endorsed by the Federal Council for Science and Technology.
>
> Through programs of the NLM the health field has sought to modernize its communication practices for purposes of education, continuing education, and research. The two major programs under development by NLM and of concern are: a projected multimedia biomedical communications network undertaken at Congressional recommendation (See Rogers Special Subcommittee report on Investigation of DHEW pp 156-157) and one specialized subsystem of this network--a national Toxicological Information System. This program has its independent Presidential authorization in a requirement placed on the Secretary, DHEW, to implement the recommendations of the PSAC Panel on Toxicological Information.

Aines also carried the battle to BOB examiners as well, calling for a compromise that would not jeopardize both of these important programs. It was a happy post-Christmas

[1] Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Weekly Report and Other Information, December 31, 1967, pp 3.

[2] Aines, Andrew A., OST, Memorandum for Dr. Donald F. Hornig, Director of OST, Subject: Funds for a National Biomedical Communications Network, December 26, 1967, pp 6.

Day message from Ralph Mueller of BOB that his office would support OST's request.[1] It was very evident to NLM and the other Federal agencies that having knowledgeable and supportive individuals in the President's Science Advisor's office made their lives somewhat easier. The COSATI community was aware of the benefits of a strong OST program and undoubtedly recognized what would happen when COSATI was transferred to NSF along with what was left of its STI staff a couple of years later.

Not only was NLM finding it difficult to obtain BOB support for its budget, the Clearinghouse for Federal STI, Department of Commerce, was experiencing similar difficulties. During a meeting with the Clearinghouse with its managers, there was an expression of deep concern that in addition to problems in getting funds, the Department of Commerce leadership was displaying little interest in its operation and its funding problems. The CFSTI leaders were perplexed because the Federal information community did not realize the extent of improvement of the Clearinghouse operations. One internal complaint was the insistence of the National Bureau of Standards, their parent organization in the Department of Commerce, that not only should CFSTI become more self-sufficient (support its program through sales of information products), but it should also carry more of the Bureau of Standards' overhead cost. Aines made the following suggestions to CFSTI: [2] Make no public complaints; keep them in house. Prepare a 5-year plan that would outline new programs and projects that will aid the Federal agencies. Prepare for an OST stewardship review that would highlight how quality has been brought into their program. Seek to organize an informal group within the Department of Commerce to improve the agency's knowledge about CFSTI function and programs. Finally, to determine what role CFSTI could and should play in non-documentary aspects of information exchange, such as: referral service, project-report handling, and reports of meetings and seminars. Discussions were held with Commerce's Dr. Kincaid about CFSTI problems and the need for/Department of Commerce front office to play the kind of strong role that D.r Donald Schon had earlier. Kincaid stated that the new a

[1] Aines, Andrew A., OST, to Donald F. Hornig, Ivan Bennett and Robert Milch, All of OST, Subject: NLM Budget Appeal, December 26, 1967. one page.

[2] Aines, Andrew A., OST, Memorandum to Donld F. Hornig, OST Director, Subject: Activities Report - Clearinghouse, 9 December 1967, pp 3.

role that Dr. Donald Schon had taken for the Department of Commerce earlier. Kincaid thought some of the problems would subside with his appointment of Dr.John Richardson to be the COSATI member. Aines disagreed, stating that while he had no negative views about Richardson, what Commerce needed was a full-time STI coordinator, nothing less; the function was too important to be undertaken on a part-time basis.

(International)

Although Chalmers Sherwin had stated that he was mollified by AEC's assurance that it would not undercut the work of his panel on standards, giving him an opportunity to come up with a product before it moved internationally, problems continued to exist. NASA was upset because AEC had forwarded the International Nuclear Information Service standards it was developing to the USA Standards Institute (USASI) for consideration without providing NASA with the opportunity to discuss them. The Department of State joined NASA in criticizing AEC for its desire to operate independently in the international area. NASA has sent AEC a sharp letter of protest. [1] One of the problems faced by AEC was its desire to gather more of the world's nuclear energy information and data. It wanted action immediately and felt that waiting for a permanent standard was holding up its program. Sherwin was quite aware of the increasing interest on the international community in the standards area, having accepted the chairmanship of an ICSU-UNESCO task group on standards. Arutyunov, the USSR STI leader, had also consented to become chairman of ICSU-UNESCO's task group on information research and development at the same time. [2] The source of the intelligence, Dr. Burton W. Adkinson, NSF, also revealed that the members of the Common Market countries were taking a less cooperative attitude than previously in the development of MEDLARS by NLM. This was confirmed by Scott Adams, Deputy Director, NLM, who was not sure, however, it this was more than temporary. Recognition of the USSR's avidity for information about computers may be one explanation why Arutyunov had taken over the chairmanship of the information R&D task group, but doubt was expressed that the United States would be taken in by

[1] Aines, Andrew A., OST, Memorandum to Donald F. Hornig, OST Director, Subject, Weekly Report and Other Information, December 31, 1967, pp 3.

[2] Aines, Andrew A., OST, Memorandum to Donald F. Hornig, OST Director, Subject: USSR and ICSU-UNESCO, 17 December 1967, pp 3.

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Soviet gambit.

During this period, there was a considerable drain of the gold reserves of the United States to Europe and elsewhere. Aines wrote in his report to Hornig:

> It is interesting that some of the countries that see no ethics involved in seeking to drain the U.S. of its gold reserves, seem to show concern if the United States treats its store of scientific knowledge as a barterable commodity.

The international climate can also be determined in a remark made by John Farmakides, Chairman of COSATI's Task Group on Legal Aspects of Information Systems, who returned from a meeting on international copyright matters held by the Department of State. The meeting was attended by representatives of foreign countries, including the Soviet Union. Farmakides expressed his view that unless greater care is exercised the Soviet Union and other countries may seek to take advantage of the United States.[1]

Increased concern resulted in the Chairman of COSATI asking Melvin S. Day, Chairman of the COSATI Panel on International Information Activities to reorganize his panel by adding members from agencies who were involved with international activities and releasing others who were not. He was also asked to invite observers from the non-governmental sector to participate. Additionally, Aines requested annual agency reports on international information and data exchanges, new initiatives being planned to exchange information or terminate on-going programs, consideration of an annual series of reviews of programs conducted by government and private sector organizations in the international field (this was extended to willing countries), and consideration of a series of one-shot meetings that would focus on future U.S. strategies dealing with international interchange of STI.

COSATI's interest in international information activities included surveillance of interactions between governments and multinational corporations. For example, during this period, Arnaud de Borchgrave, now the editor of the Washington Times, reported in Newsweek (December 25, 1967) that Italy's Olivetti "which is already the Soviet

[1] Aines, Andrew A., OST, Memorandum to D.F. Hornig, Director, OST, Subject: Activities Report (International Copyright), December 9, 1967, pp 3.

government's advisor on mechanization and automation of office procedures, is about to land a $100 million to $150 million contract for the modernization of the Soviet's bureaucracy -- a deal that will make the Italian firm privy to Russia's corridors of power." In the same article, he reported that Britain's ICI, the largest chemical company in West Europe, has negotiated an exchange of advanced technological know-how for Soviet pure research -- "a deal made possible because Russia is now willing to pay for patents and is anxious to sell its own overseas." [1] There is lingering doubt that the arrangement between Olivetti and the USSR resulted in the former's becoming "privy to Russia's corridors of power," but the Chairman of COSATI considered it part of his duty to keep the Director of OST informed of the shifts and changes in the international information arena. It is conceivable that one reason why the last two directors of OSTP have given low priority to STI matters is that they lacked a flow of information provided by a technical assistant who kept them aware of developments in the information area that could reveal changes in science and technology policy on the international scene.

SATCOM held the center stage as the year came to an end. In the last week in November 1967, it sponsored a major information community meeting at the National Academy of Sciences. The purpose of the meeting was to both assess the progress report of SATCOM and to seek recommendations for furth activities for this group. There was a surprising amount of criticism from SATCOM members and even from some of the visitors. Some observers stated that SATCOM was being influenced too much by vested interests, while others contended that the engineering community was getting less attention than the scientific community. Others argued that SATCOM was trying to cover so much territory that it covered none and yet others argued that SATCOM was not addressing the important questions that needed answers. In all fairness to SATCOM, it was evident that not too many of the participants were familiar with the overall problems of scientific and

[1] Aines, Andrew A., OST, Memorandum to Donald F. Hornig, Director of OST, Subject: Activities Report and Information Trends, December 24, 1967, pp 3.

technical communication, nor did they really know too much about SATCOM. It was also evident that SATCOM was not yet the bridge to the scientific community that it was intended to be.[1] About a month later, SATCOM held a meeting at the National Library of Medicine. The meeting turned out to be a small battlefield because of the discussion of the pending Copyright Bill and how SATCOM should respond to a National Academy of Science study on the bill. The report of the rest of the meeting is as follows.[2]

> Amid charges of support of vested interests, Curtis Benjamin of McGraw-Hill, Inc. pushed hard to get SATCOM to encourage the passage of the bill. No argument was presented (by attendees) against setting up the commission to study the copyright problem. Several officials of the National Library of Medicine disucssed their programs in toxicology, research and development, MEDLARS, and audio-visual services. Great interest was shown by the SATCOM members in the scope of NLM services, the lack of fee charges to the medical profession, the expense of making computer searches for individuals, and other economic and managerial aspects of the NLM operation.

Some of the charges made at the November 1967 meeting at NAS about SATCOM trying to cover too much territory and that it was being influenced by vested interests had some reverberations at the meeting at NLM.

[1] Aines, Andrew A., OST, Memorandum to Donald F. Hornig, Director of OST, Subject: Activities and Views, (Satcom Meeting Notes), 25 November 1967, pp 5.

[2] Aines, Andrew A.., OST, Memorandum to Donald F. Hornig, OST Director, Subject: Some of the Week's Action, December 17, 1967, pp 2.